State of Washington, WaTech

MAINFRAME ASSESSMENT SERVICES FINAL REPORT MEETING

Kathy Rudy, Partner
Milford Sprecher, Account Director Public Sector
Cindy LaChapelle, Principal Consultant
Andrew Vlahakis, Senior Consultant
John Schick, Principal Consultant

July 31, 2017

imagine your future®

Mainframe Assessment Services – Draft Report Meeting

STATE OF WASHINGTON – WATECH

Agenda

1. Objectives and Scope
2. Executive Summary
   - Current State ("As-Is") Results and Recommendations
   - Alternate Service Delivery Models – Assumptions and Market Pricing
   - Next Steps and Timeline
3. Benchmark Recommendations
   - Mainframe
   - Mainframe Storage
   - Stakeholder Interviews / DR Solution
4. Additional Benchmark Insights, Results & Findings
   - Mainframe
   - Mainframe Storage
   - Alternate Service Delivery Options & Market Pricing
   - Management Services
5. Appendix
   - Economies of Scale, Project Scope Details, Engagement Management, and Reference Group Selection

ISG™ imagine your future®

Objectives and Scope

Engagement Background and Objectives

ISG was assigned to conduct a benchmark of State of Washington, WaTech Mainframe Services.

General Conditions for the Benchmark

The analysis shall include the implications to the State with respect to outsourcing the Mainframe Services including potential impact related to security, privacy, data location, availability, bandwidth, storage, fees related to access of storage, contractual obligations, confidentiality obligations, sharing data across disparate sources, public records, and record retention issues. Analysis will include:

- A comparison of the cost of the current approach to the cost of a variety of alternatives, including options around contracting with a private (non-state) entity to provide most or all services.
- A summary of the pros and cons of each of the proposed options, outlining leading practices from ISG clients.
- A review of potential transition costs for the alternative approaches.

Scope

Mainframe and Mainframe Storage Services, FTEs, and Costs are includes in the scope of this assessment.

- Technology Scope – Mainframe and Mainframe Storage
- ISG will benchmark current performance based on the cost, quality, and productivity across the in-scope Mainframe and Mainframe Storage Services against a reference group of companies of similar size and complexity as well as to the supplier market.
  - ISG will identify performance gaps and provide directional analysis and corrective actions to address those gaps.
  - ISG will provide current market prices (and scenario pros and cons) if services were to be outsourced, for the following scenarios:

Scenarios:				
• As-Is / base-case	• Vendor managed environment in current data center	• Vendor managed environment in another data center	• Migrating workloads to a dedicated solution hosted in another data center	• Migrating workloads to a cloud-based (or shared) mainframe provider

Out of Scope Costs

The following costs were reviewed but considered to be outside the scope of the benchmark analysis.

Excluded Benchmark Costs:	**Other Out of Scope Costs:** **(Collected and reviewed at a high level only)**
Hardware and software depreciation greater than 3 years.	Management Services and IT Security
Application development, maintenance, management, and support software	The Facility charges for hosting the Mainframe environment in Olympia were reviewed separately
Application DBAs	
IT Admin and other departments offering supporting services.	
Network Telecom and DWDM	
Mainframe Application Development and Maintenance FTEs	

Executive Summary
- Current State (“As-Is”) Results and Recommendations

ISG™ imagine your future®

WaTech reported $10M in scope costs and 28.1 FTEs

The tables below shows the breakdown of annual in-scope costs.

Overall Cost by Type and Technology Area

Annual cost of IT, in $000 USD	WaTech	WaTech %	Mainframe	Mainfrae Storage	Mgmt. Services
Personnel	$3,141	31%	$2,311	$113	$716
Hardware	$347	3%	$80	$267	
Software	$4,878	48%	$4,459	$418	
Services	$1,749	17%	$1,688	$37	$24
Total	**$10,114**	**100%**	**$8,538**	**$836**	**$740**
Percentage of Total	**100%**		**84.4%**	**8.3%**	**7.3%**

Overall Number of FTEs Reported

FTEs (Employees and Contractors)	WaTech	WaTech %
Mainframe	20.4	53%
Storage	1.00	3%
Management Services	6.74	18%
Sub-Total Employed FTEs Only	**28.1**	74%
Mainframe Purchased Service Command Center (CC) FTE Equivalent	10.1	26%
Total FTEs including CC FTE equivalent	**38.3**	100%

- Of the reported costs, software costs comprised the largest component at 48%, which is typical In Mainframe environments.
- Personnel (employed FTEs) is the second largest percentage of spend (31%). Including the Command Center staff providing Mainframe support in Production Control and Operations increases the total equivalent Personnel cost to 42% of the annual spend.
- The Mainframe costs represent 84.4% of the in-scope spend with Storage and Management Services accounting for the other 16.6% of spend.
- WaTech's percentage of spend for Management Services at 7.3% is comparable to that of the Reference Group Average (RGA) which ranged from 7-12%.
- WaTech reported 28.1 employed FTEs to in-scope services. When the 10.1 FTE equivalent staff associated to mainframe in the Command Center services charges are included, this increases to 38.3 FTEs.

In-scope costs represent 68 percent of WaTech's FY'17 Budget

- Out of scope items include application software.
- ISG estimated Mainframe hardware annualized purchase costs for hardware between 3 and 6 years old. In the ISG model purchases made more than 3 years ago are considered fully depreciated for comparative purposes.
- WaTech's Mainframe is approximately 39 months old (purchased Dec 2013) and is depreciated on a 6-year flat depreciation. Monthly depreciation payment provided was $39,298 / month.

Budget Reconciliation	Annual $000	%
FY'17 Expenses ($000 USD)	$14,900	100%
ISG Out of Scope		
OoS Software	$930	6%
Hardware Depreciation	$801	5%
Other OoS	$3,055	21%
ISG In-Scope	$10,114	68%

Overall Key Performance Indicators

- The Reference Group Average (RGA) represents companies based on a number of criteria (size, complexity, service quality, service efficiency, etc.) which are outlined in more detail in the appendix. The companies in the RGA are top performing companies benchmarked by ISG in the last 12-18 months comparable in scope to WaTech. The RGA companies represent companies with sustainable leading practices for mainframe.
- WaTech is spending more on a unit cost basis in both the Mainframe and Mainframe Storage towers with lower productivity.
- WaTech does not regularly track and report the same number of quality metrics that ISG typically observes among the RGA companies.

KPI Comparator	Mainframe		% Difference (Higher or Lower)
	WaTech	RGA	
Annual Cost / MIPs $000	$7.12	$4.47	59.1%
Productivity - Configured MIPs per Virtual FTE	39.3	141.3	-72.2%
Average response time during prime shift (secs)*	<3.0	0.2	Lower
Actual availability of production system images during prime shift as a percentage of planned uptime	100%	100%	Comparable
Configured MIPs	1,199	2,237	

* WaTech reported that 99% of prime shift transactions complete in less than 3 seconds

KPI Comparator	Mainframe Storage		% Difference (Higher or Lower)
	WaTech	RGA	
Annual Cost / TB Virtual Tape Storage $000	$2.63	$2.52	4.4%
Productivity - Addressable TB of VTL Storage / Storage FTE	311	444	-30.0%
Annual number of virtual tape outages that have prevented data access per virtual tape subsystem or appliance	0.00	0.67	Higher
Addressable TB of VTL Storage	124.2	319.0	

WaTech Mainframe Strengths

This is a summary of areas where WaTech's performance exceeds that of the Reference Group companies.

- WaTech's Mainframe hardware costs per MIPs are 92% lower than the Reference Group companies. WaTech's mainframe was purchased more than 3 years ago and under the ISG comparative is considered fully depreciated.
- On average, the Reference Group companies spend $880K more on mainframe hardware than WaTech annually.
- WaTech has lower annual software unit costs in two areas – transaction processing and middleware. As a result, WaTech spends $398K less annually on software products for these sub-processes that the Reference Group companies on average.
- WaTech has a long-term staff with extensive experience and expertise in the WaTech environment providing strong support to users as communicated in stakeholder interviews. However, these staff are potentially moving into retirement in the next 5-10 years and available qualified replacement staff are not actively being recruited.

Summary of Recommendations and Opportunities – "As-Is" Environment

The following table summarizes the key Mainframe recommendations from the analysis. Opportunities represent areas where WaTech's performance falls short of the Reference Group companies and WaTech could potentially lower cost or improve service if operating at the level of these top performing companies.

#	Recommendations Mainframe	Benefits if Operating at the Level of the RGA	Timeframe	Priority
1	WaTech should reduce staffing levels (including the impact of the Command Center (CC) service). ISG recommends WaTech implement more automation or transitions to a service provider to address this opportunity. The current opportunity is $1.82 Million and includes personnel costs associated to Mainframe employed FTEs (20.4 FTEs) and the CC staffing service (10.1 additional equivalent FTEs). WaTech has already begun this process and in July 2017 will reduce their effective personnel costs from the CC team by $579.5 K / year. This reduction results in 5.1 fewer CC staff. Remaining savings opportunity is $1.24 Million / year.	**$1.24 Million per year**	**12-18 months**	**Med**
2	WaTech's DR solution included excess capacity for the Mainframe MIPs – reduce the current contracted 3,226 MIPs to 1,500 MIPs. Contract cost per MIPs/Month is $6.427/MIPs/Month. WaTech's current use of "softcaps" for software licensing effectively reduces the configured MIPs of their production mainframe to 1,199 MIPs.	**$0.133 Million per year**	**9-12 months**	**High**
3	ISG recommends improved software purchasing coordination internal to the State of Washington and/or contract review, for all software products which are assignable (can be moved a service provider) and transferable (can be moved to another location or machine), as contracts near renewal to recognized RGA level pricing. ISG has excluded Software AG from the value of this recommendation due to the highly restrictive nature of the Software AG contract and its current term which extends to 2022.	**$1.27 Million per year**	**18-36 months**	**Med**
	Total Mainframe Services	**$2.64 Million per year**		

Summary of Recommendations and Opportunities – "As-Is" Environment

The following table summarizes the key Mainframe Storage recommendations from the analysis. Opportunities represent areas where WaTech's performance falls short of the Reference Group companies and WaTech could potentially lower cost or improve service if operating at the level of these top performing companies.

#	Recommendations Mainframe Storage	Benefits if Operating at the Level of the RGA	Timeframe	Priority
4	ISG recommends WaTech perform an analysis into the total cost of Mainframe Storage to understand these costs, particularly if they decide to outsource these services and/or move to a provider data center. WaTech currently contracts Mainframe Storage through their larger central WaTech Storage team and leverages the economies of scale of this hardware for their Mainframe capacity. The staffing dedicated to the Mainframe Tiered Disk Storage seems high for the relatively small volume (15.5 TB) supported.	**Potential savings on tiered disk storage - $0.0589 Million per year**	**24-48 months**	**Low**
	Total	**$ 0.0589 Million per year**		
#	**Other Recommendations – Future Strategy Decisions**			
5	WaTech should take the lead in establishing their preferred path forward and long-term strategy for the Mainframe and communicate this to their key customers. WaTech's primary customers (State of Washington agencies – DRS, LNI, OFM, etc.) are concerned that as workloads migrate off the mainframe their costs will rise. None of these customers sees the Mainframe platform as one in which they will develop new applications.		**12-18 months**	**High**

Executive Summary
- Alternate Service Delivery Models
– Assumptions and Market Pricing

ISG™ imagine your future®

Alternative Delivery Models - Assumptions

- Transition costs are not included in the alternative model market pricing.
  - ISG typically observes additional costs between 4-6% per tower depending on scope, complexity, and other factors for service provider transition.
- Pricing for alternative models doesn't include costs for WaTech's retained staff to manage/govern and architect alternative solutions provided by an external service provider.
- WaTech "As-Is" pricing does not include Management Services personnel costs ($716K/yr.) but does include the Command Center staff cost reduction ($579.5K/yr.) in effect as of July 2017.
- Market pricing provided is at service levels that ISG considers market-standard for mainframe services.
  - Higher or lower levels of service will impact pricing.
  - Given the business requirements of agencies using the WaTech Mainframe, ISG considered highly available and highly redundant market comparators.
- The current mainframe workload is expected to decline over the next 5 to 7 years due to re-platforming and/or retirement of older applications.
- WaTech experienced senior staff are getting ready to retire or already retiring.
- Service Provider will leverage on shore resources for the Mainframe service delivery.
  - relaxing this constraint and allowing off shore resourcing (India, etc.) would result in additional price reductions.

Key Considerations & Recommendations – Alternative Service Delivery Models

- ISG was contracted to look at several alternative options for service delivery. Models consider include continuing with the current "As-Is" model leveraging internal resources, moving to a fully managed service (operating in the WaTech DC or migrating to another third party DC and Mainframe as a Service (flex cost and capacities based on usage). ISG recommends a phased strategy for migration to a managed service model which is aligned to software contract renewal terms. The most restrictive software contract being the contract with Software AG which next renews in 2022.
- * ISG does not consider the Mainframe as a Service model as a viable option for WaTech. The Mainframe as a Service implies ability to flex both capacity and cost on demand as required by the business. With almost half of mainframe cost is related to software, and software contracts tied to capacity, the ability to flex a mainframe service up and down in capacity with an accompanying reduction in cost is not straightforward or viable.
- Most hosted managed services offerings for mainframe will require a commitment to capacity and base volumes for both hardware and software as part of their standard pricing structure over the term of the contract. The Managed Service options below could be adapted/negotiated to include pricing reductions based on declining capacity however annual capacity reductions would need to be negotiated up front.

Current "As-Is"	Managed Service : Phases 1 & 2a, 3	Managed Service: Phases 1 & 2b, 3	Mainframe as a Service*
• As-Is / base-case • WaTech continues to operate the current environment "As-Is" with internal resources.	• Vendor managed environment in current data center. • Service Provider gradually assumes ownership / responsibility and/or replaces WaTech mainframe hardware and software (as contracts renew - end of Phase 1 or early Phase 2b).	• Vendor managed environment in another data center – all workloads migrate to shared hardware or dedicated hardware in another data center (end of Phase 1 or early Phase 2b). • Service Provider gradually assumes ownership / responsibility for all software (as contracts renew). Service Provider may assume ownership/responsibility of the WaTech HW while still supporting the environment in the WaTech DC.	• * Migrating workloads to a cloud-based (or shared) mainframe provider – costs and capacity flex in a "pay as you go" model.

Annual Cost Savings – Alternate Managed Service Delivery Model

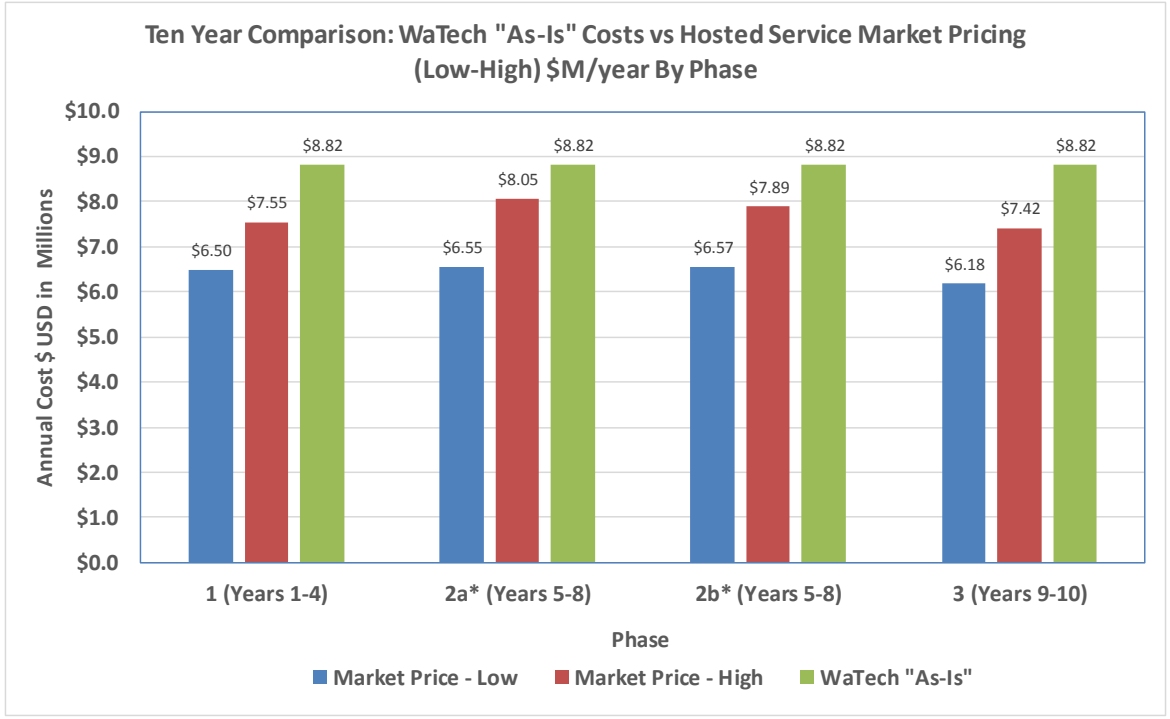
ISG recommends WaTech approach their migration to a mainframe managed service in phases.

Annual Cost per MIPS USD	Phase			
	1 (Years 1-4)	2a* (Years 5-8)	2b* (Years 5-8)	3 (Years 9-10)
Market Price - Low	$5,421	$5,466	$5,476	$5,152
Market Price - High	$6,298	$6,716	$6,580	$6,191
WaTech "As-Is"	$7,355	$7,355	$7,355	$7,355
Annual Cost Savings $000	**Phase**			
(Assumes current 1,199 MIPs)	**1 (Years 1-4)**	**2a* (Years 5-8)**	**2b* (Years 5-8)**	**3 (Years 9-10)**
Minimum	$1,268	$766	$929	$1,396
Maximum	$2,319	$2,265	$2,253	$2,641
* assumes some sort of a hardware refesh by the service provider				

- The table above summarizes annual cost per MIPs in USD for each of Phases for Market range and for the WaTech “As-Is” (do nothing) scenarios. Also summarized for each phase is the expected annual savings in $000 USD associated to the high and low market pricing compared to the WaTech “As-Is” costs.
- The Phase 1 pricing assumes that all software costs except Software AG will transition to the Service Provider (SP) or the SP will replace WaTech tools with one which they leverage as part of their overall mainframe management service. The service provided by the SP includes the SP assuming the WaTech HW ownership and continuing to operate in the WaTech data center.
- Phases 2a and 2b assume some level of hardware refresh is performed by the SP but no HW refresh of the “As-Is” scenario for WaTech. The SP service offering includes all mainframe hardware and software ownership reside with the SP and are included in the annual pricing. Phase 2a – managed service within WaTech DC and Phase 2b - managed service in SP DC.
- By Phase 3 ISG is assuming that the workload will be significantly lower than the present-day workload and/or completely migrated but no adjustments to unit prices for this smaller workload have been made.

Alternate Managed Service Delivery Model Cost Comparison

ISG recommends WaTech approach their migration to a managed service in phases. The chart below shows the annual cost for each of the proposed phases for the WaTech "As-Is" environment and the high and low Market Pricing for comparable hosted managed services.

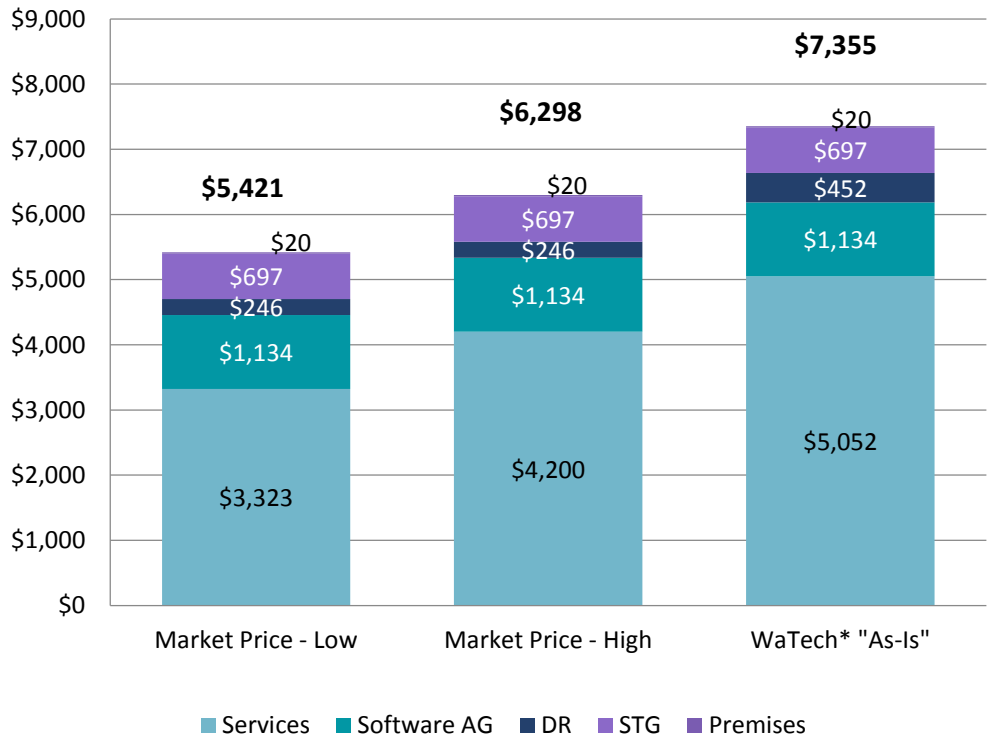


Annual Cost in Millions of USD	Phase			
	1 (Years 1-4)	2a* (Years 5-8)	2b* (Years 5-8)	3 (Years 9-10)
Market Price - Low	$6.50	$6.55	$6.57	$6.18
Market Price - High	$7.55	$8.05	$7.89	$7.42
WaTech "As-Is"	$8.82	$8.82	$8.82	$8.82

Phase 1

- Phase 1 – Years 1-4: Hosted Managed Service in WaTech DC. These Services include:
  - Service Provider assumes ownership of WaTech HW.
  - Service Provider assumes SW costs as part of the hosted service offering as contracts expire.
    - ISG considers Software AG to be out of scope in this phase based on current contract term as well as assignment and transferability constraints.
    - ISG assumed all other software would be transitioned to the provider as contracts came up for renewal / renegotiation.
  - Storage continues to be offered and supported by the WaTech Storage teams.
  - Potential to move DR solution to the Service Provider in their data center.
- ISG's observation of market pricing for mainframe services shows 2-4% reductions in mainframe pricing year on year.
- WaTech will need to have an appropriately scaled retained staff to manage, govern, and architect the future state environment.
- "As-Is" cost for WaTech assumes current annual spend for Mainframe and Mainframe Storage remain constant. Impact of Command Center reduction is included in the "As-Is" cost for the purposes of this comparison.

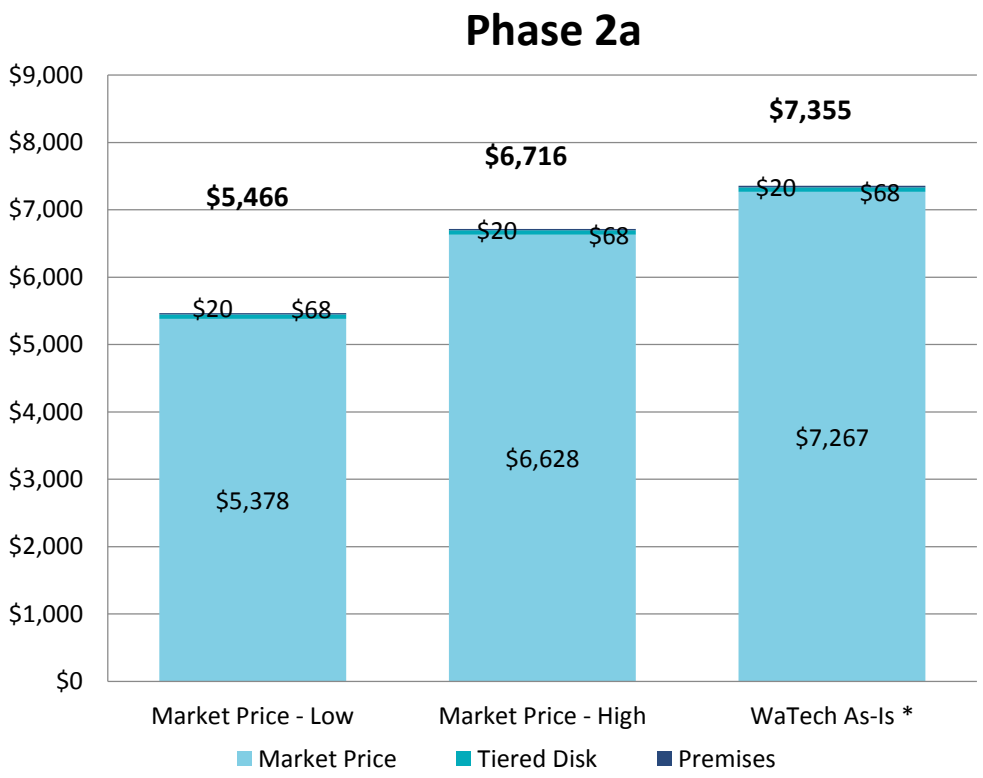
Total Annual Market Price per Configured MIPS (in USD), with adjustments for scenario



Phase 2a

- Phase 2a – Years 5-8: Hosted Managed Service in WaTech DC.
  - Service leverages WaTech original HW in the WaTech data center or refreshes the HW in the WaTech Data center.
  - Service Provider also assumes ownership of SW licensing, in full.
  - Tiered Disk Storage continues to be offered and supported by the WaTech Storage team.
  - Virtual Tape Storage solution moves to the Service Provider.
  - Assumes DR solution has moved to the Service Provider.
- In Years 5-8 all software contracts, including Software AG, will be open for re-negotiation.
- At this point, all original WaTech hardware would be considered fully depreciated and almost ~10 years old.
- WaTech will need to have an appropriately scaled retained staff to manage, govern, and architect the future state environment.
- ISG's observation of market pricing for mainframe services shows 2-4% reductions in mainframe pricing year on year.
- "As-Is" cost for WaTech assumes current annual spend for Mainframe and Mainframe Storage remain constant. Impact of Command Center reduction is included in the "As-Is" cost for the purposes of this comparison.

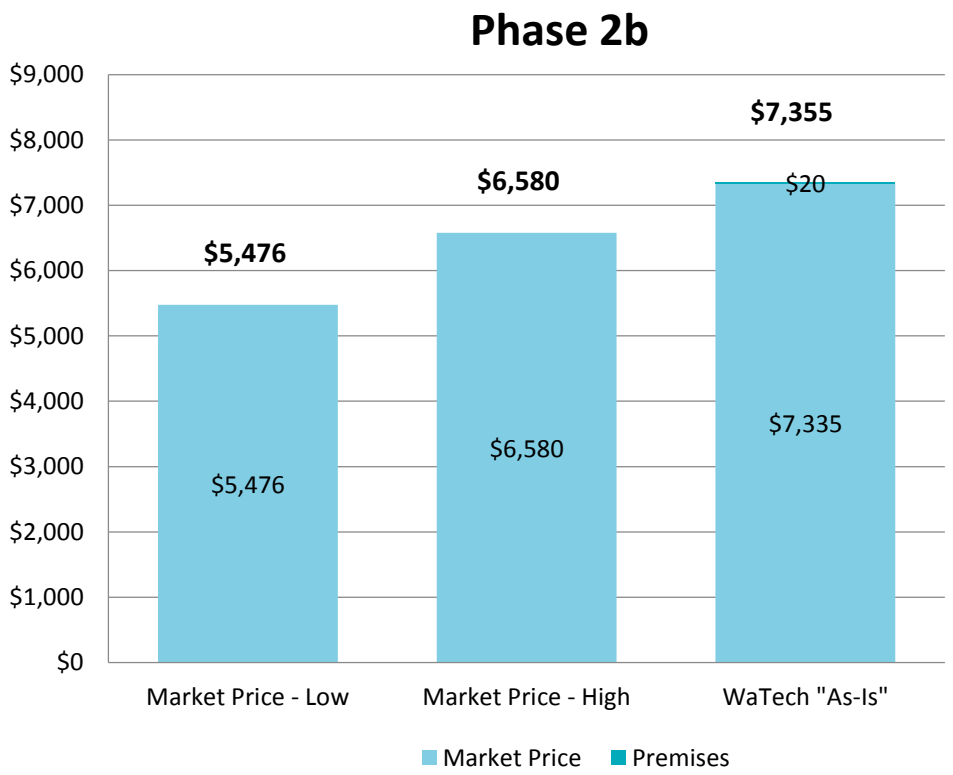
Total Annual Market Price per Configured MIPS (in USD), with adjustments for scenario



Phase 2b

- Phase 2b – Years 5-8: Hosted Managed Service in Provider DC.
  - WaTech workload migrates to new HW– either dedicated **or** shared mainframe hardware in the Service Provider DC.
  - Service Provider also assumes ownership of SW licensing, in full.
  - Storage solution provided by Service Provider for both Tiered Disk and Virtual Tape.
  - Assumes DR solution has moved to the Service Provider.
- In Years 5-8 all software contracts, including Software AG, will be open for re-negotiation.
- At this point, all original WaTech hardware would be considered fully depreciated and almost ~10 years old.
- ISG's observation of market pricing for mainframe services shows 2-4% reductions in mainframe pricing year on year.
- WaTech will need to have an appropriately scaled retained staff to manage, govern, and architect the future state environment.
- "As-Is" Cost for WaTech assumes current annual spend for Mainframe and Mainframe Storage remain constant. Impact of Command Center July 2017 reduction is included in the "As-Is" cost for the purposes of this comparison. Management services personnel costs are not included.

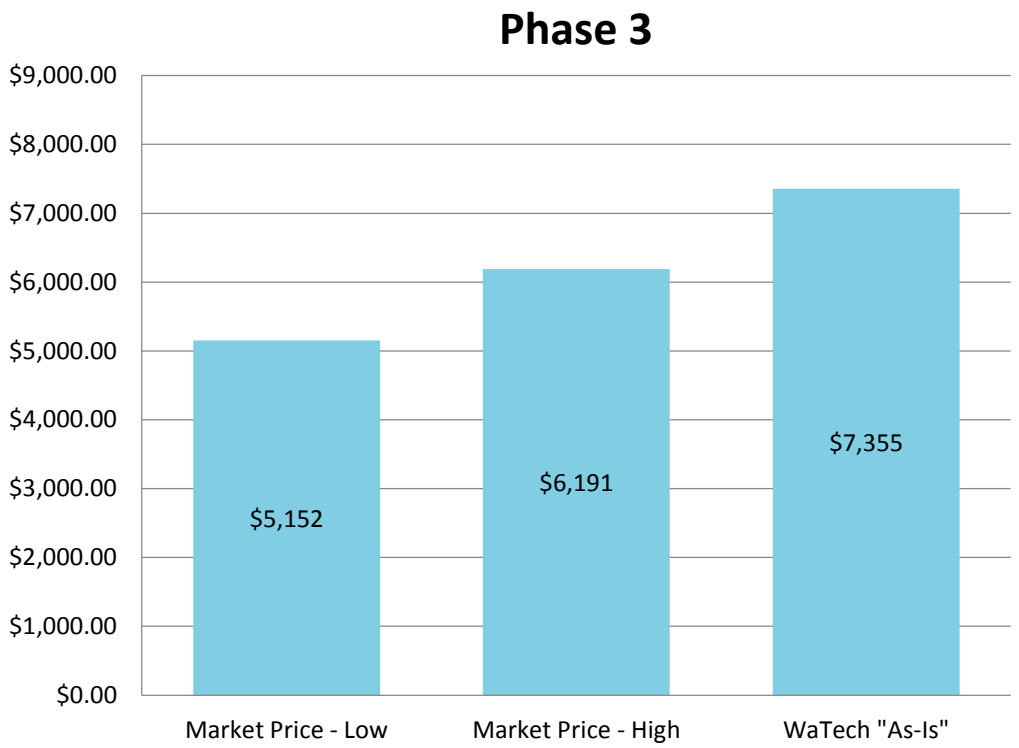
Total Annual Market Price per Configured MIPS (in USD), with adjustments for scenario



Phase 3

- Phase 3 – Years 9-10 : ISG assumes that WaTech and their customers will complete the migration of all remaining apps off the Mainframe platform by the end of year 10.
- ISG has assumed that the workload by the end of year 8 would be significantly lower than current due to migrations completing in years 5-8 but for the purposes of this market price indication ISG as only applied a 3% reduction per year over the price ranges from Phase 2b.
- WaTech will need to have an appropriately scaled retained staff to manage, govern, and architect the future state environment.
- "As-Is" Cost for WaTech assumes current annual spend for Mainframe and Mainframe Storage remain constant. Impact of Command Center reduction is included in the "As-Is" cost for the purposes of this comparison.

Total Annual Market Price per Configured MIPS (in USD), with adjustments for scenario



Executive Summary
- Next Steps and Timeline

ISG™ imagine your future®

WaTech Mainframe Service Roadmap Customer Perspective

Future

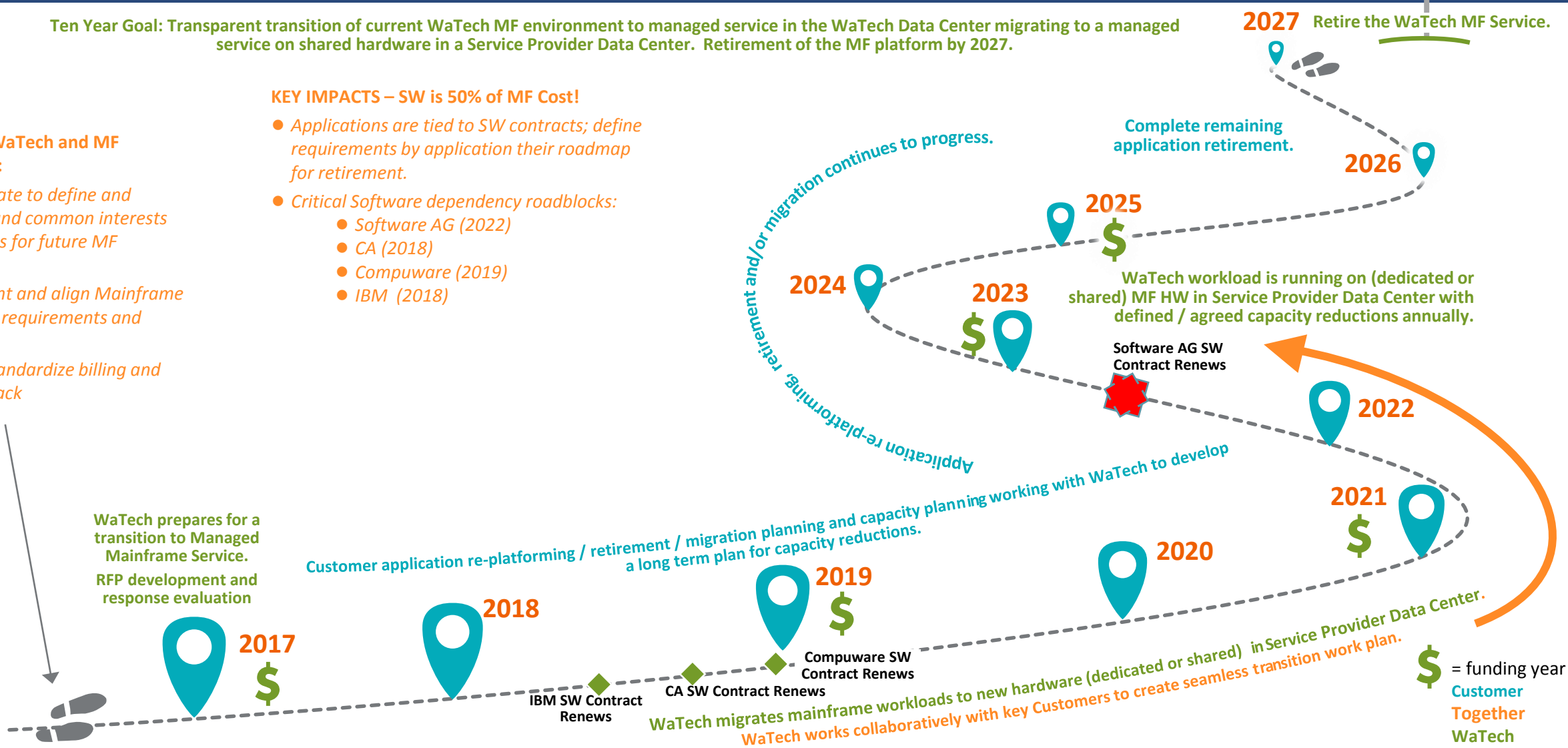
Ten Year Goal: Transparent transition of current WaTech MF environment to managed service in the WaTech Data Center migrating to a managed service on shared hardware in a Service Provider Data Center. Retirement of the MF platform by 2027.

Together WaTech and MF Customers:

- *Collaborate to define and understand common interests and goals for future MF services.*
- *Document and align Mainframe business requirements and SLAs.*
- *Agree standardize billing and chargeback*

KEY IMPACTS – SW is 50% of MF Cost!

- *Applications are tied to SW contracts; define requirements by application their roadmap for retirement.*
- *Critical Software dependency roadblocks:*
  - *Software AG (2022)*
  - *CA (2018)*
  - *Compuware (2019)*
  - *IBM (2018)*



WaTech Mainframe Service Roadmap WaTech Perspective

Future

Ten Year Goal: Transparent transition of current WaTech MF environment to managed service in the WaTech Data Center migrating to a managed service on shared hardware in a Service Provider Data Center. Retirement of the MF platform by 2027.

Together WaTech and MF Customers:

- *Collaborate to define and understand common interests and goals for future MF services.*
- *Document and align Mainframe business requirements and SLAs.*
- *Agree standardize billing and chargeback*

KEY IMPACTS – SW is 50% of MF Cost!

- *Applications are tied to SW contracts; define requirements by application their roadmap for retirement.*
- *Critical Software dependency roadblocks:*
  - *Software AG (2022)*
  - *CA (2018)*
  - *Compuware (2019)*
  - *IBM (2018)*

2018-2019: WaTech negotiates with SP to define long-term capacity reductions and pricing.

- *Transition MF services (HW/SW and support) Negotiate timing for key software renewals.*
- *Decision on WaTech MF HW retirement.*

WaTech prepares for a transition to Managed Mainframe Service.

RFP development and response evaluation

2017 $

2018

Transition to SP Begins

IBM SW Contract Renews

CA SW Contract Renews

2019 $

Compuware SW Contract Renews

Customer application re-platforming / retirement / migration planning and capacity planning working with WaTech to develop a long term plan for capacity reductions.

WaTech migrates mainframe workloads to new hardware (dedicated or shared) in Service Provider Data Center.

WaTech works collaboratively with key Customers to create seamless transition work plan.

WaTech MF HW fully depreciated

2020

Transition to SP DC Begins

2021 $

2022

Transition to SP DC Complete

Software AG SW Contract Renews

2023 $

2024

2025 $

2026

Application re-platforming, retirement and/or migration continues to progress.

Complete remaining application retirement.

WaTech workload is running on (dedicated or shared) MF HW in Service Provider Data Center with defined / agreed capacity reductions annually.

2027 **Retire the WaTech MF Service.**

$ = funding year

Customer

Together

WaTech

Next Steps

Prior to moving to an alternate Service Delivery Model, ISG recommends that WaTech consider the following

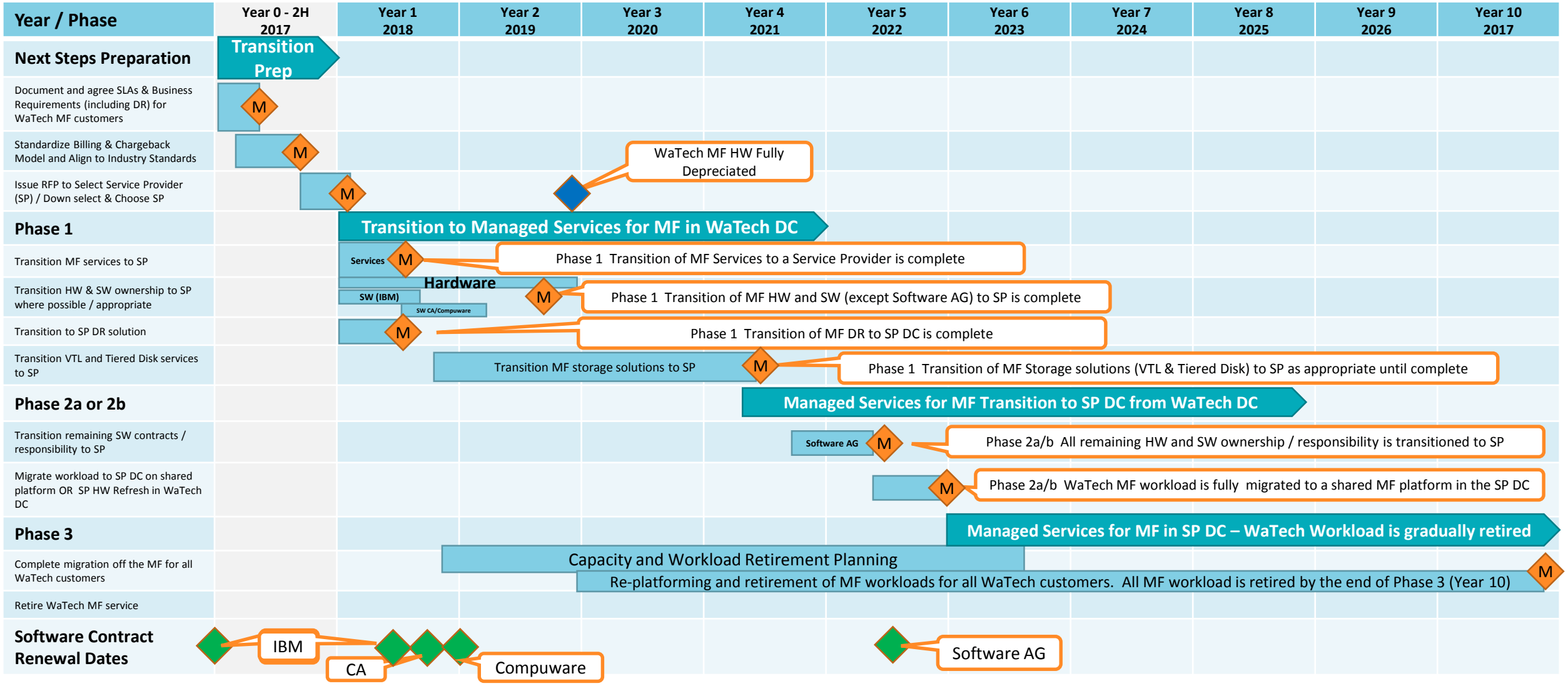
- ISG recommends WaTech pursue an alternative service delivery option though outsourcing via a managed service offering through a service provider. In preparation for this transition ISG recommends the flowing actions:
  - Establish and formalize documented service levels and business requirements to set realistic expectations with key WaTech mainframe customers and to ensure business alignment.
    - This should include establishing realistic RTO and RPO expectations for the DR service with SunGard and their key customers.
    - Establishing formal SLAs will be required before engaging in any alternate service delivery model with a service provider and will allow WaTech to better quantify expectations for service performance from a service provider. Higher service levels for support and performance can also drive higher service provider pricing.
    - Establish dashboard for performance measurement and monitoring.
  - Standardize billing and chargeback models for all WaTech customers that align to industry standards and practices used for an outsourced service. Improve communication and billing transparency to key customers.
    - Standardize and increase transparency for current chargeback / billing models and align to industry standards for mainframe pricing with service providers to help simplify the transition to a hosted service model.
    - ISG suggests regular user group meetings and the development of an agreement to a more standardized billing structure that is portable to any alternate service delivery model.
    - Work with key customers to establish a realistic timeline and sizing for declining capacity requirements.
  - Develop a realist 3-5-year software management plan with the goal of transitioning software ownership and licensing to the Service Provider as WaTech Software contracts come up for renewal and renegotiation

Next Steps Continued

Prior to moving to an alternate Service Delivery Model, ISG recommends that WaTech consider the following

- ISG recommends WaTech pursue an alternative service delivery option though outsourcing via a managed service offering through a service provider. In preparation for this transition ISG recommends the flowing actions:
  - Increase cross communication between WaTech's key client and other state agencies with mainframe environments to identify synergies and areas of cooperation, provide more future opportunities for workload consolidation and process automation and software resource utilization optimization.
    - Identify an opportunities to leverage state-wide, cross agency enterprise software contracts to lower costs and standardize terms for key software vendors such as Software AG, CA, IBM, etc.
    - Communicate and align WaTech's go-forward 5-10-year strategy for the Mainframe service with key users and other agencies or departments with a vested interest in a Mainframe service.
  - Increase synergies to reduce redundant effort within the current "As-Is" Mainframe and Mainframe Storage environment, WaTech Command Center team, the WaTech Central Storage team and SunGard's DR service to drive greater efficiencies and higher productivity.
    - Leverage greater automation and integration of effort for managing and maintaining the current mainframe environment workload, where possible in the near term, including streamlining processes and work effort to optimize end to end staffing resource utilization.
    - Begin preparation for an RFP process for implementing a Managed Service though a Service Provider which is initially hosted in the WaTech data center (Phase 1).
      - Review Phase 1 options for current WaTech Mainframe HW – WaTech retains ownership/responsibility until the current HW is fully depreciated or Service Provider assumes ownership/responsibility at the earliest possible time.
      - Review Phase 2 options (2a – Managed Service remains in WaTech DC or 2b - WaTech workload migrates to a Managed Service in a Service Provider DC) to refine WaTech's ability to implement against the proposed timeline for the ISG recommended phases.

WaTech Phased Transition to Managed Service Timeline



Mainframe Service Providers

Most service providers in the mainframe space offer both on premise based services and hosted services within their data centers. Some examples of service providers offering mainframe hosted services are below. Tier Two providers tend to cater to small to mid-sized environments, like WaTech's, as their "client sweet spot".

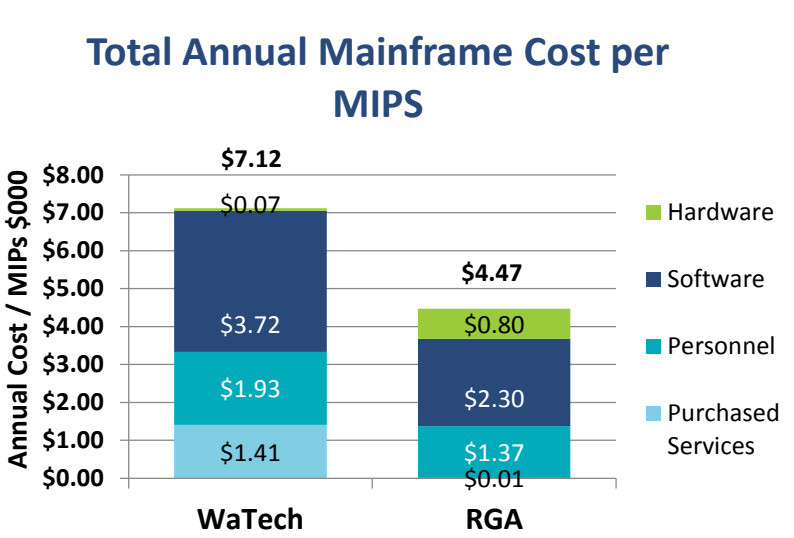
- Tier One Providers include:
  - IBM
  - DXC (new HP-CSC merged service)
- Tier Two Providers include:
  - Ensono
  - Blue Hill
  - VION

Benchmark Recommendations - Mainframe

ISG™ imagine your future®

WaTech Mainframe – Cost per MIPs

WaTech's combined unit cost of Mainframe is $7.12 per configured MIPS 59% higher when compared to the RGA.



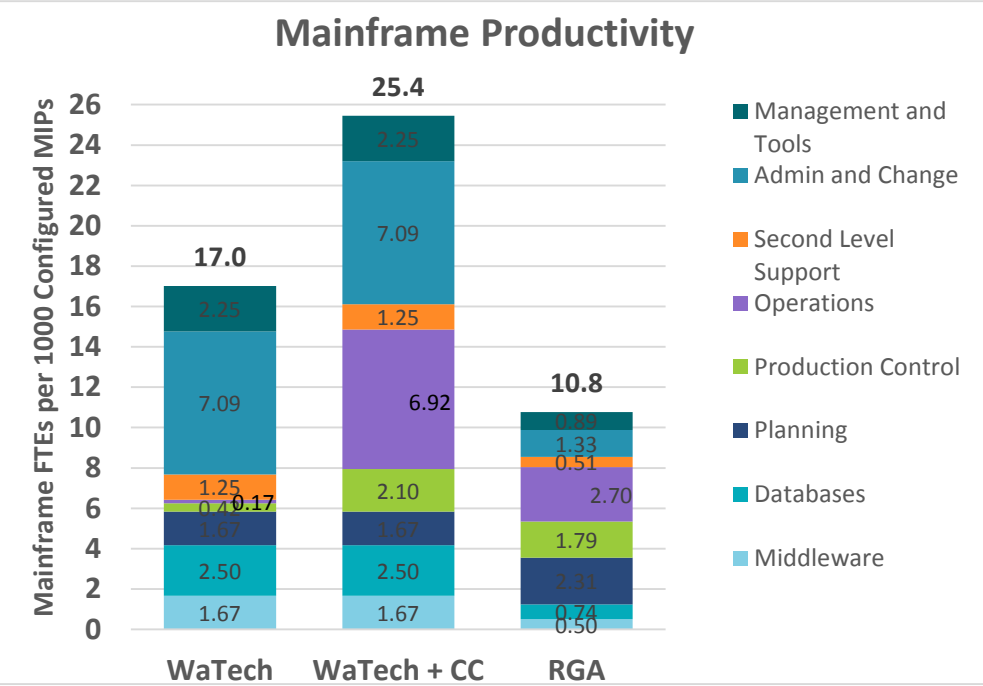
- WaTech's overall annual cost per MIPs is 59% higher than the RGA.
- 68% of WaTech's mainframe purchased service cost is attributable mainframe services from the WaTech Command Center (CC) team. The remaining 32% is for the SunGard DR solution.
- If the annual cost per MIPs for DR is removed then WaTech's annual cost per MIPs is 53% higher than the RGA.
- WaTech's annual hardware costs are 92% lower than the RGA – mainly due to WaTech having older hardware that under the ISG comparative model is fully depreciated.
- WaTech' annual software cost per MIPs is 62% higher than the RGA. These costs are analyzed in more detail in subsequent slides.

Annual Mainframe Cost per MIPs in $000 USD	WaTech	WATech %	RGA	RGA%	% Difference (Higher or Lower)
Purchased Services	$1.41	20%	$0.01	0.13%	
Personnel	$1.93	27%	$1.37	31%	41%
Software	$3.72	52%	$2.30	51%	62%
Hardware	$0.07	0.94%	$0.80	18%	-92%
Total Annual Mainframe Cost per MIPS	**$7.12**	100%	**$4.47**	100%	**59%**
Total Number of Configured MIPS	1,199		2,237		
s					
Total Annual Mainframe Cost per MIPS wo DR	**$6.67**	6%	**$4.35**	3%	**53%**
Effective Personnel (including CC) Cost per MIPs	$2.88		$1.37		111%

- WaTech's effective personnel (employed FTEs + Command Center purchased services) comprises approximately 42% of WaTech's total annual cost per MIPs compared to approximately 31% for the RGA.
- WaTech's effective personnel cost is 111% higher than the RGA.

WaTech Mainframe – Productivity

WaTech leverages more than twice the number of staff per 1000 configured MIPs for their Mainframe services compared to the RGA. This will continue to be true even after the Command Center reduction in July 2017.



FTEs per 1000 Configured MIPs	WaTech	WaTech + CC	RGA	% Diff RGA to WaTech	% Diff RGA to WaTech + CC
Middleware	1.67	1.67	0.50	230%	230%
Databases	2.50	2.50	0.74	239%	239%
Planning	1.67	1.67	2.31	-28%	-28%
Production Control	0.42	2.10	1.79	-77%	17%
Operations	0.17	6.92	2.70	-94%	156%
Second Level Support	1.25	1.25	0.51	146%	146%
Admin and Change	7.09	7.09	1.33	432%	432%
Management and Tools	2.25	2.25	0.89	153%	153%
Total	**17.0**	**25.4**	**10.8**	**58%**	**136%**
Total (Virtual FTEs per 1000 MIPs)		**25.4**	**10.8**		
Total (Virtual FTEs per 1000 MIPs) (After July 1, 2017)		**21.2**	**10.8**		

- WaTech's overall productivity (employed FTEs only) is 58% lower than the RGA.
- When equivalent virtual FTEs for the Command Center (CC) purchased services are included (WaTech + CC column in the table below) WaTech requires more than twice the FTEs per 1000 MIPs compared to the RGA.
- None of the RGA companies had any significant impact on productivity from purchased services.
- If the RGA annual unit cost of personnel of $1,370 per MIP was applied to the WaTech environment then WaTech is overspending by $1.82 million per year.
- In July 2017 WaTech expects to reduce the impact from the CC team from 10.1 FTE equivalents to 5 FTE equivalents. This will result in an annual reduction of effective personnel spend $579.6K. Further improvements in productivity for WaTech Mainframe personnel would result in potential additional savings opportunities for WaTech annually of $1.24 million.
- The RGA equivalent staffing level for WaTech's volumes and service levels would be in the range of 12.5-15 FTEs compared to WaTech's current level of 30.5 FTEs (20.4 employed FTEs + 10.1 CC FTEs).

WaTech Mainframe Software Comparison

ISG believes there are significant future opportunities for annual savings in software. These savings would require a product by product review however and some current contracts may require renegotiation if WaTech wants to move to a fully outsourced delivery model.

Annual Cost of Mainframe Software per Configured MIPS,in $000's	WaTech	WaTech %	RGA	RGA %	% Difference (Higher or Lower)	WaTech Cost Opportunity if Operating at the Level of the RGA* $000	WaTech Strengths $000
Transaction Processing	$0.34	9.2%	$0.53	23.2%	-36%		-$229.81
Interactive Processing	$0.08	2.0%	$0.01	0.6%	428%	$73.07	
Batch Processing			$0.09	4.0%			
VM Processing			$0.00	0.0%			
Mainframe Middleware	$0.05	1.3%	$0.19	8.1%	-75%		-$167.88
Mainframe Databases*	$1.44	38.6%	$0.65	28.3%	121%		
Production Control	$0.28	7.6%	$0.14	6.2%	97%	$166.25	
Mainframe Operations	$0.23	6.1%	$0.12	5.4%	84%	$124.60	
Mainframe Processors	$0.53	14.2%	$0.41	17.8%	29%	$143.34	
Mainframe Management and Tools	$0.78	20.9%	$0.15	6.3%	435%	$759.13	
Total	**$3.72**	**100%**	**$2.30**	**100.0%**	**62%**	**$1,266.40**	**-$397.69**

Annual Software Cost per Configured MIPs $000 USD	Computer Associates	Compuware	IBM	Software AG	Other	Total
Transaction Processing		$0.01	$0.31		$0.02	$0.34
Interactive Processing	$0.03		$0.04			$0.08
Batch Processing						
VM Processing						
Middleware			$0.01		$0.04	$0.05
Databases	$0.05	$0.02	$0.23	$1.13		$1.44
Production Control	$0.22				$0.06	$0.28
Mainframe Operations	$0.09		$0.13			$0.23
Mainframe Processors	$0.03		$0.44		$0.06	$0.53
Management and Tools	$0.38	$0.01	$0.19		$0.19	$0.78
Total	**$0.81**	**$0.05**	**$1.36**	**$1.13**	**$0.37**	**$3.72**
Total	**21.7%**	**1.3%**	**36.7%**	**30.5%**	**9.9%**	**100.0%**

- Annually 36.7% of WaTech's mainframe software spend is with IBM, 30.5% is with Software AG and 21.7% with CA. The remaining 11.1% is with CompuWare (1.3%) and other vendor software products.

- WaTech has potential annual Mainframe software cost savings of $1.27 million / year in the areas of interactive processing, production control, mainframe operations, mainframe processors, and mainframe management and tools.
- WaTech's annual Mainframe software spend is lower than the RGA in transaction processing, and middleware.
- The annual cost per MIPs for Software AG database is 4-50 times higher than any other database product that WaTech uses and is 3 times higher than the RGA database software annual cost per MIPs. The impact of the Software AG impact to WaTech's software cost per MIPS was removed from the overall opportunity for software annual savings.

Annual Software Spend Allocations by Vendor

The majority of WaTech's annual spend on software are Mainframe related (91.4%) vs Mainframe Storage related (8.6%). ISG believes there are $1.27 million / year in potential opportunities for future savings in Mainframe software.

- WaTech has potential annual Mainframe software cost savings of $1.27 million / year in in the areas of transaction processing, production control, mainframe operations, mainframe processors, and mainframe management and tools (details outlined in the following slide).
- Achieving these savings has a number of dependencies including the current software contract terms and conditions and WaTech's ability to transfer licenses to other locations or machines or assign software contracts / licenses to a service provider in the event that WaTech decides to leverage a managed/hosted service option in the future. Service providers should be able to negotiate lower pricing for IBM and CA software given their greater volumes and buying power but this may not be true for all products. Due to the highly restrictive nature of the Software AG contract and the fact that the current contract extends into 2022, ISG has excluded Software AG from the assessment of potential savings opportunities for Mainframe software.
- All of the Software AG spend is associated to Mainframe databases.
- The majority (93% or higher) of IBM, CompuWare, and all Other software products are for the Mainframe service vs Mainframe Storage services. 71.8% of the annual spend on CA software products are for Mainframe services vs Mainframe Storage services.

Vendor	Annual Software Spend $000 USD			WaTech MF SW % of Total	WaTech MF STG SW % of Total
	Total	Mainframe	Mainframe Storage		
Computer Associates (CA)	$1,347	$967	$379	19.8%	7.8%
CompuWare	$56	$56	$0	1.2%	0.0%
IBM	$1,646	$1,636	$10	33.5%	0.2%
Software AG	$1,360	$1,360	$0	27.9%	0.0%
Other	$469	$440	$29	9.0%	0.6%
Total	**$4,878**	**$4,459**	**$418**	**91.4%**	**8.6%**

Mainframe Software Contracts – Constraints and Limitations

Annual software costs comprise 48% of WaTech's annual spend for in-scope services. ISG has identified significant potential savings in this area - $1.27 M / year.

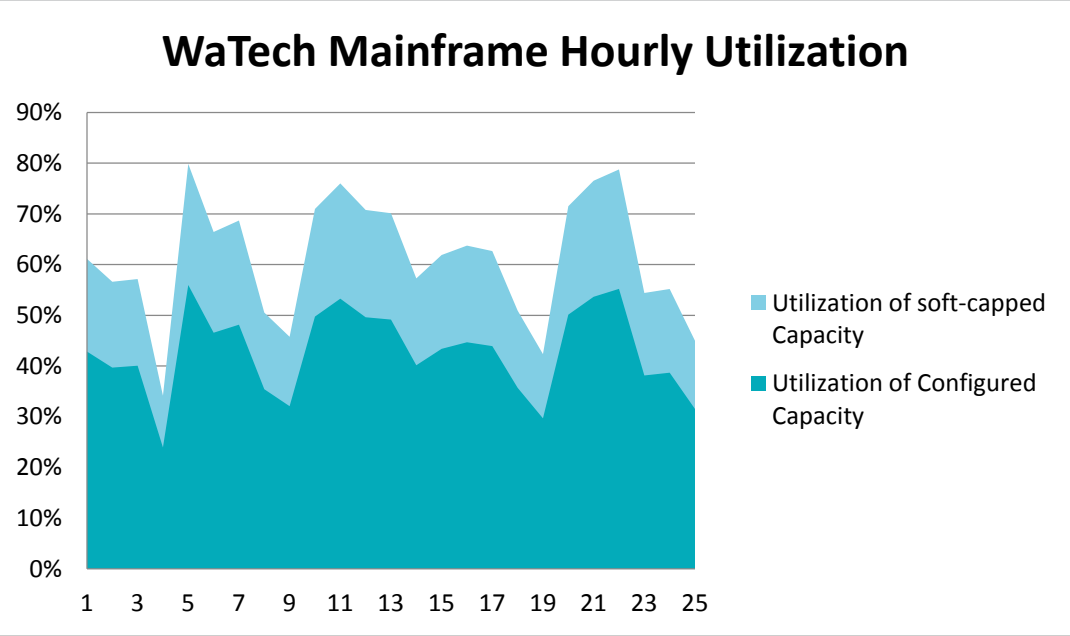
- Software costs comprise 62% of WaTech's annual cost per MIPs and 485 of their total annual spend for in-scope services. These software cost break down by vendor as follows:

Vendor	Annual Software Spend $000 USD			WaTech % SW In-Scope Spend	Next Renewal for Current Contract	Estimated Ability to Transfer or Assign
	Total Spend	OoS Spend	In-scope spend			
Computer Associates (CA)	$1,461	$114	$1,347	27.6%	9/30/2018	Moderate
CompuWare	$168	$112	$56	1.2%	12/30/2018	Moderate
IBM	$1,839	$193	$1,646	33.7%	7/1/2017	Easy to Moderate
Software AG	$1,360	$0	$1,360	27.9%	6/30/2022	Difficult
Other	$980	$511	$469	9.6%	-	-
Total	**$5,808**	**$930**	**$4,878**	**100.0%**		

- In order to better understand the cost and process for assigning or transferring licenses (ownership or from machine to machine) for each of these key software contracts WaTech needs to review and consider the individual terms of each contract. While this is beyond the scope of this benchmark some high-level analysis and review of some of the key vendor contracts was performed. Some key insights from this analysis:
  - Software vendors tend to lock in their revenue through 3-5 year agreements with significant cancellation/termination penalties in order to protect their revenue.
  - For some software vendors, like Software AG, service providers may face higher software costs than individual clients due to the fact that the software is licensed to a larger shared environment machine.
  - Software assignments to a provider and/or transfer of licenses from the current mainframe machine to a provider's machine requires consent from the software vendor and may require a renegotiation or increase in fees.
  - For many common mainframe software products from vendors like IBM and CA service providers may be able to leverage their greater buying power to negotiate lower software pricing which is more closely aligned to the RGA level of spend.
  - Develop a long term plan (that extends beyond the current longest SW contract term) for software cost management.

CPU Utilization Profile

CPU utilization of the Soft-Capped Capacity of the Mainframe is higher at WaTech than the RGA.



- The average CPU utilization of the Mainframe, based on the soft-capped data, is higher at WaTech than the RGA.
- Not all RGA members have implemented soft-capping, when considering the total configured capacity of the machine, the utilization is lower than the RGA.
- Based on the levels of Batch running overnight, WaTech's utilization during prime and non-prime shift is the same.
- Many of WaTech's software licensing charges are tied to a maximum MSU / usage metric. If soft-caps could be lowered further without impact to online performance then usage limits on key contracts could also be decreased thereby lowering WaTech's annual software costs.

CPU Utilization	WaTech	RGA
Overall Utilization of Soft-Capped Capacity	61.1%	
Overall Utilization of Configured Capacity	42.8%	51.9%
Utilization of Soft-Capped Capacity Prime	61.1%	
Utilization of Soft-Capped Capacity Non-Prime	61.1%	
Utilization of Configured Capacity during Prime	42.8%	57.9%
Utilization of Configured Capacity during Non-Prime	42.8%	49.3%

Recommendations – Software Asset Management

While the gain from many process-improvement initiatives are hard to measure, software asset management offers tangible and measurable benefits. WaTech has potential opportunities to leverage agreements with vendors, that could offer additional economies of scale.

Gaining control over the costs of the software inventory is a gradual process in which many incremental steps are taken to:

- Qualify alternative and competing products or services.
- Manage demand for required products.
- Migrate to products that have both commercial and strategic advantage.
- Manage time frames and commitments to match demand forecasts.

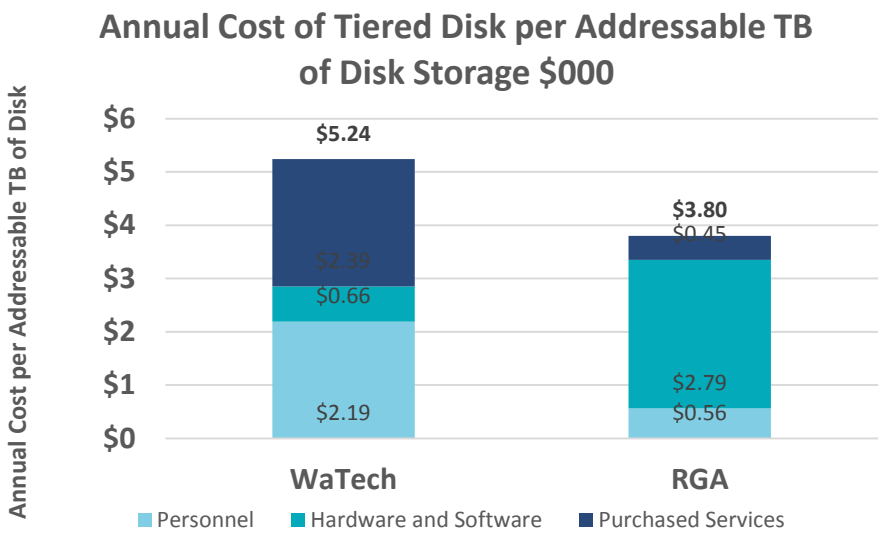
Planning when to take these incremental steps over a three to five-year period requires deeper cooperation and coordination between WaTech and other state agency Mainframe Development teams, the WaTech Mainframe system administrators, Procurement, and in some cases the users. Any group acting or negotiating alone would not fully understand how their decisions would impact the other groups and would miss opportunities to leverage enterprise-wide purchasing power, so accountability should be established for creating and administering the plan of these actions to be taken in managing software costs.

Benchmark Recommendations - Mainframe Storage

ISG™ imagine your future®

WaTech Mainframe Storage – Tiered Disk Cost per Addressable TB

WaTech's total annual unit cost of Mainframe Disk Storage is 38% higher than the RGA.

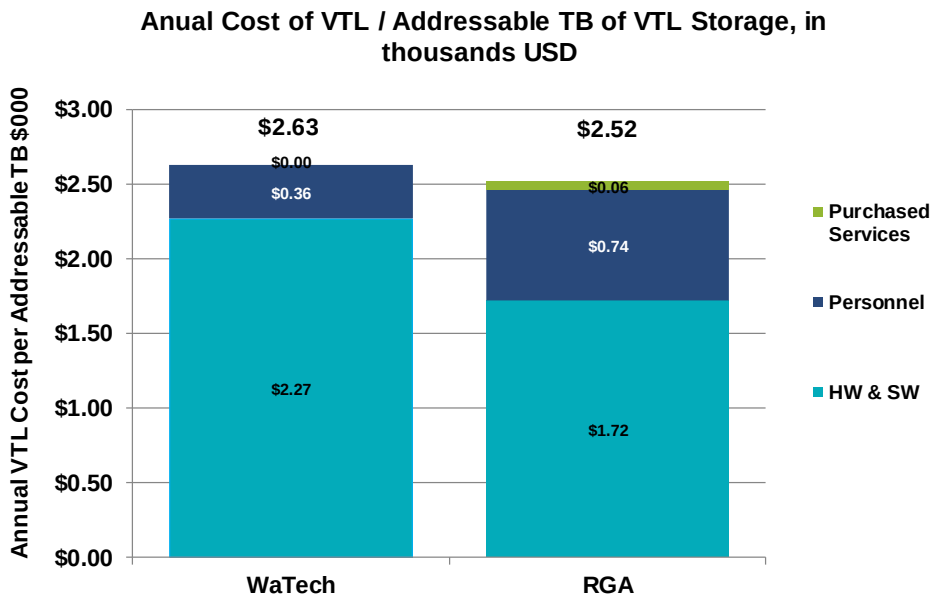


- WaTech's total annual Tiered Disk Storage cost per addressable TB of Tiered Disk is 38% higher than the RGA. If WaTech were to operate at the RGA level there is a potential savings of $58.9K per year.
- WaTech's purchased services are for services, hardware, and software provided by the WaTech central Storage service to the Mainframe Disk Storage team for their Mainframe environment. It is not possible to provide any greater transparency into this cost.
- WaTech only has 0.3 FTEs dedicated to Mainframe Tiered Disk Storage but the volume of disk being managed is also very small at only 15.5 TB.

Annual Cost of Tiered Disk per Addressable TB of Tiered Disk Storage $000	WaTech	RGA	% Difference (Higher or Lower)	WaTech Annual Cost Opportunity if Operating at the Level of the RGA $ USD
Personnel	$2.19	$0.56	292%	
Hardware and Software	$0.66	$2.79	-76%	
Purchased Services	$2.39	$0.45	431%	
Total	**$5.24**	**$3.80**	**38%**	**$58,900**
Addressable TBs of Tiered Disk	15.5	193.0		

WaTech Mainframe Virtual Tape – Annual Cost per Addressable TB

WaTech's total annual unit cost of Mainframe Virtual Tape Storage per addressable TB of Virtual Tape is comparable to the RGA.

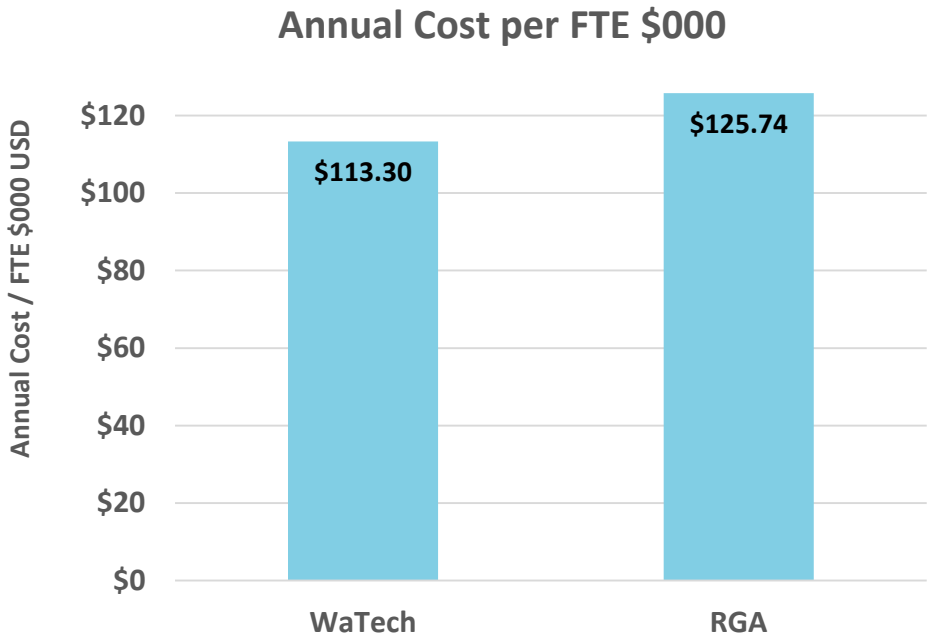


- WaTech's total annual Virtual Tape cost per addressable TB of VTL Storage is comparable to the RGA. For the purposes of this analysis ISG combined the costs and effort to manage both the production VTL and DR VTL environments.
- WaTech only has 0.4 FTEs dedicated to Mainframe Virtual Tape Storage but the volume of disk being managed is also small at only 62.2 TB per VTL device. WaTech's productivity for virtual tape storage is comparable to the RGA.

Annual Cost of VTL / Addresable TB VTL Storage in $000	WaTech	RGA	% Difference (Higher or Lower)
Hardware and Software	$2.27	$1.72	
Personnel	$0.36	$0.74	
Purchased Services	$0.00	$0.06	
Total	**$2.63**	**$2.52**	**4%**
Addressable TB of VTL Storage	124.4	319.4	

WaTech Mainframe Disk Storage Annual Cost & Productivity Per FTE

WaTech's annual cost per FTE is 10% lower than the RGA but the RGA Tiered Disk FTEs can Managed 371% more disk per FTE for Tiered Disk. WaTech's productivity for Virtual Tape Storage is comparable to the RGA.



- WaTech's annual cost per FTE is 10% lower than then RGA.
- WaTech Tiered Disk storage requires approximately 4.7 times more FTEs for Tiered Disk than the RG. WaTech has a complex model for Mainframe Storage management. Dedicated Mainframe Storage FTEs manage the disk storage allocated to the Mainframe by the Central WaTech Storage Team. However, the Central WaTech Storage Team manages the overall storage frames and storage allocations within the larger WaTech organization.
- WaTech's Mainframe Disk is on a shared storage platform with midrange disk. The specifics of this configuration and the effort to manage it are out of scope for this benchmark. ISG collected the cost of hardware, software and services from the Central WaTech Storage team as a monthly purchased service.
- WaTech's Virtual Tape Storage environment requires a comparable number of virtual tape storage FTEs to manage their mainframe virtual tape environment when compared to the RGA.

Productivity Mainframe Storage	WaTech	RGA
Tiered Disk FTEs / 100 TB Addressable Tiered Disk	1.93	0.41
Virtual Tape FTEs / 100 TB Addressable Virtual Tape	0.32	0.36

Annual Cost per FTE $000	WaTech	RGA	% Diff
Annual Cost per FTE	$113.30	$125.74	-10%

Benchmark Recommendations
- Stakeholder Interviews
- Disaster Recovery Solution

ISG™ imagine your future®

Stakeholder Interview Insights

The following common themes were voiced throughout several of the stakeholder interviews

- WaTech key customers/stakeholders are looking to WaTech for their leadership on the forward-looking strategy for the Mainframe platform.
- All key stakeholders voiced concern over the viable life span of the Mainframe services and also are looking at options for replatforming however timeframes to replatform and migrate all loads off the Mainframe are long (5-7 years). Many of the stakeholders noted that their applications running on the WaTech Mainframe are legacy application which are 20-30 years old. Previous attempts to replace or replatform have failed or not been given funding.
- All stakeholders are constrained by the state government funding process – all finding must be approved by the legislature and these budget review periods are biennial. This is a key reason why migration to a more modern platform is expected to be slow and extend over a 3-7-year period.
- Service levels are informal with little to no formal documentation - most stakeholders provided positive feedback on the service levels achieved but could offer no formal documentation on the required service levels for their business needs. Formalizing service levels, even when the services are delivered internally, can help set realistic expectations for the services provided and control costs.

Stakeholder Interview Insights

The following common themes were voiced throughout several of the stakeholder interviews

- Several of the key stakeholders deliver statewide, cross agency services and require high availability. LNI, for example, delivers services for state insurance which require the same level of availability and uptime as private industry insurance providers. As a result, many of the key stakeholders, like LNI, feel the pressure for remaining competitive with other private companies offering comparable services.
- All stakeholders expressed concern over not wanting to be the last customer requiring the Mainframe services and be left “holding the bag” for the majority of the service cost.
- All stakeholders expressed concern over the aging mainframe resource pool and how to fill this gap as current SMEs begin to retire. However, they are not expecting WaTech to provide a solution for their staffing requirements which they currently deliver through their own agency.
- Several stakeholders would like to see more formal user communication. Implement via formal regular user group meetings / forums to help identify synergies between business needs and interests as well as areas of cooperation to optimize resources. Topics for this user group could include future strategy, building a consolidated view of the migration timeframes and associated efforts over all major initiatives, managing demand, and consumption to lower overall peak levels and plan more effectively for deployment and testing as replatforming and modernization efforts begin, etc.
- Several stakeholders would like to see greater transparency in the billing and utilization for the services they consume. Develop a more standardized billing structure that is portable to any alternate service delivery model.

Interview Insights - Department of Transportation

The Department of Transportation runs its own older Mainframe environment. ISG interviewed DoT with the intent of better understanding advantages and/or barriers to consolidating this environment into the WaTech mainframe service.

- The Department of Transportation runs an older independent Z10 small mainframe environment (approximately 80 MIPs; ~10 MSU) which is near end of support (next year or two). Environment is currently run with very "lean" resourcing (staff and infrastructure). There are no genuine business issues to upgrade at this time. Their overall workload is fairly consistent and the DoT will likely need to pursue alternatives within the next 2 years. DoT believes current costs are lower than the industry average.
- DoT still uses tape for their disaster recovery approach mainly because this is more cost effective and, like WaTech, leverages SunGard services. DoT has 48-hour recovery time objectives (RTO) expectation in a disaster. However, like many other agencies interviewed SLAs are not formalized.
- DoT has been mandated to migrate into the State data center in Olympia – their current 1 year waiver to this migration expires at the end of 2017. This mandate includes their mainframe.
- Ten years ago, DoT conducted a critical application assessment and identified 10 critical mainframe applications. DoT began a program to replace these apps but to date only one, payroll, has been replaced. The other 9 applications still run on the mainframe.
- DoT funding is separate from the rest of the state of Washington – separate budget and funding source and the 18th amendment precludes Transportation dollars from being spent for non-Transportation activities. Any alternate solution needs to be cost effective for DoT to be able to take advantage of it and it needs to be a "cost neutral" acquisition. Funding is reviewed every 2 years and on carry over of costs is not permitted. Any consolidation must be of financial benefit to DoT not just the state.

Interview Insights - Department of Transportation

The Department of Transportation runs its own older Mainframe environment. ISG interviewed DoT with the intent of better understanding advantages and/or barriers to consolidating this environment into the WaTech mainframe service.

- DoT has looked at the option of consolidating into the WaTech mainframe previously but there were always issues which have prevented this such as software licensing, (CA, CompuWare and Software AG). The cost of licenses to move over to WaTech mainframe (a larger machine) would increase significantly which prevented any migration. There is some potential overlap of contracts and terms but this would need further investigation. DoT contracts are typically 3-5 year terms but vary by provider but can terminate for any reason – may not apply to Software AG. If DoT could replace Adabas (Software AG) with DB2 they would but this would be an onerous migration.
- DoT suggested that the Department of Enterprise Services (DES) may be the appropriate body to help coordinate software license agreements and alignments across all state agencies.
- In 2020 a license to use for their core financial system from AMS expires (AMS was acquired by CGI). The DoT is negotiating this currently to extend beyond 2020. If an extension is not possible than this will be a major catalyst for migrating to the successor of their current solution which would eliminate a large number of their mainframe applications (timing 4-6 years).
- Other potential challenges – security solutions are different (DoT is ACF2(CA) and WaTech is RACF (IBM)).
- Prospect for next 3-5 years – DoT thought they would be off the mainframe by now but given the progress to date their best-case estimate of timing is now 4-6 years for all migrations to complete. DoT is hoping for a 5-year plan from WaTech to help establish options moving forward.

SunGard Disaster Recovery Solution Insights

The following items require review from WaTech to ensure the DR solution provides the level of availability that WaTech customers expect.

- The DR service and strategy for the Mainframe is one which all stakeholders believe adds value and was critical to ensuring business continuity for their mission critical applications.
- WaTech does testing of the SunGard solution 2 times per year – the WaTech tests pertain solely to the Mainframe infrastructure not the client application environments. Some clients, but not all, test their application DR solutions in concert with the WaTech tests.
- WaTech is currently paying for the following capacities for their Mainframe "hotsite" at SunGard:
  - 3,226 MIPs
  - 79.872 MB IBM memory
  - 17 TB IBM DASD
- The term "hot site" implies that the WaTech environment is installed and ready in the event of a disaster however this is not how the SunGard solution works. In the event of an actual disaster SunGard has 72 hours to respond and make available the contracted resources. WaTech then requires 24-72 hours to configure the DR environment leveraging their VTL solution at the DR location. This timeframe does not include the required build and testing time for all the client environments and apps. The implication to this is that it could take 96-144 hours to rebuild the WaTech mainframe environment before mission critical applications could resume. Since the WaTech mainframe has critical functions for payroll, insurance claims, investments, etc. this timeframe appears to significantly exceed the 72-hour RTO that clients are expecting.
- In addition, WaTech does not have any priority for SunGard resources in an actual disaster declaration other than superseding any testing activities by other clients – the service is currently designed on a first come first served basis.
- Once operating the contract specifies operation for 6 weeks after declaration and any time after that is subject to termination if another customer declares.

SunGard Disaster Recovery Solution Insights & Recommendation

The following items require review from WaTech to ensure the DR solution provides the level of availability that WaTech customers expect.

- Currently WaTech has softcaps which essentially limit the available configured MIPs to 1,199 for software licenses. Since the WaTech environment is not growing WaTech should considered downsizing the SunGard configuration to be more aligned to their software capped capability. WaTech pays $6.427 / month / MIP – lowering the required MIPs to 1,500 could result in savings of $133.12 K annually.
- Another consideration is that in the event of an actual disaster there are additional fees:
  - $25,000 declaration fee
  - $20,000 daily usage fee (6-week fee = $84,000)
- WaTech's percentage of the Mainframe annual spend for disaster recovery is 6.3% compared to a slightly lower average spend of 3-5% for the RGA companies. Given that WaTech's SunGard solution is not dedicated or prioritized over other customers and that it is not really a hot site in that failover happens immediately ISG would expect WaTech's solution to fall closer to the lower end of the RGA values at 3%.

Additional Detailed Benchmark Insights, Results & Findings - Mainframe

ISG™ imagine your future®

WaTech Reported Annual Mainframe Costs By Purchase Type

The table below shows the breakdown of personnel, hardware, and software costs by purchase, lease, and maintenance.

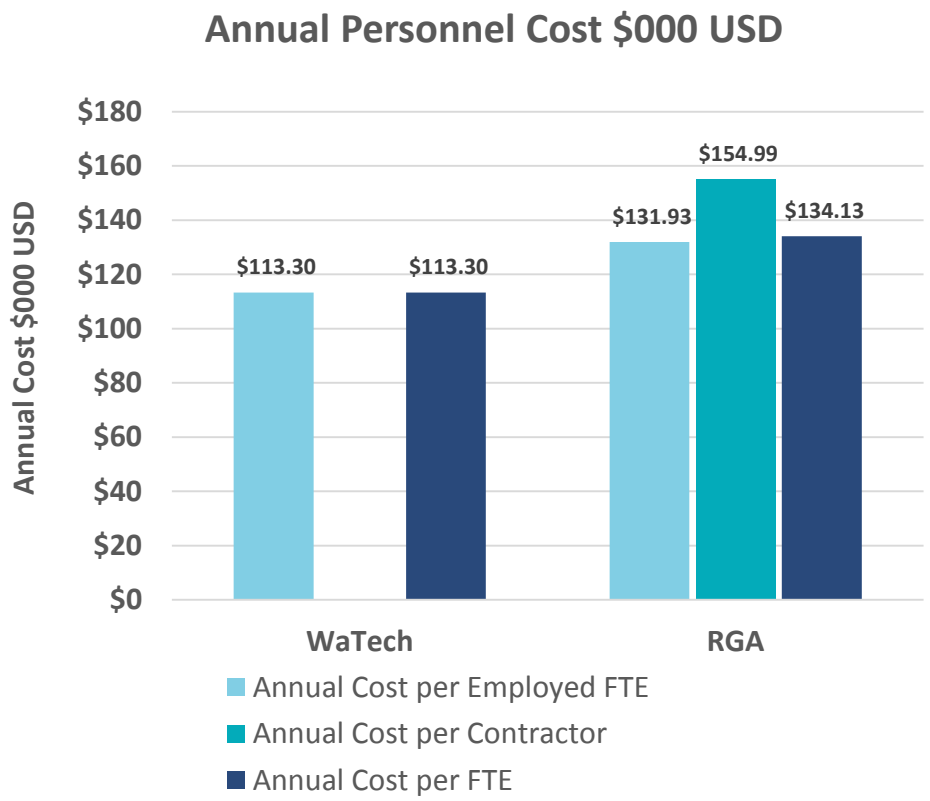
- The $10.1M of annual in-scope spend has been reported against the following cost buckets for purposes of ISG's analysis.
- The main cost items are personnel costs, SW maintenance licenses, and purchased services agreements.
- WaTech had minimal hardware purchases in the last 3 years.
- Most of the annual services costs (65.5%) are for Command Center staff for monitoring and production control for the Mainframe. This annual cost represents an equivalent of 10.1 FTEs.

Annual cost of IT, in $000 USD	WaTech	WaTech %	Mainframe	Mainframe Storage	Management Services
Personnel (Employees)	$3,141	31.1%	$2,311	$113	$716
Personnel (Contractors)					
Hardware Lease					
Hardware Purchase	$37	0.4%		$37	
Hardware Maintaintenace	$310	3.1%	$80	$230	
Software Lease					
Software Purchase					
Software Maintainence	$4,878	48.2%	$4,459	$418	
Services	$1,749	17.3%	$1,688	$37	$24
Total	**$10,114**	**100%**	**$8,538**	**$836**	**$740**

Annual Services Cost Breakdown in $000 USD	WaTech	WaTech %
Command Center Staff for MF	$1,146	65.5%
SunGard DR Solution	$542	31.0%
Premises - Olympia Data Center	$24	1.4%
Charge back - Central Storage for Tiered Disk	$37	2.1%
Total	**$1,749**	**100.0%**

WaTech Mainframe – Annual Cost Per FTE

WaTech's annual cost per FTE is 16% lower than the RGA. WaTech does not have any contractors managing Mainframe services.



- WaTech's annual cost per FTE is 16% lower than then RGA. However, when Command Center FTEs are included in the total number of FTEs required to deliver Mainframe services the overall annual personnel cost is 111% higher than the RGA.
- If WaTech were operating at the RGA level of productivity they would require 12.9 FTEs compared to the 30.5 (employed + CC) FTEs they require currently.

Number of FTEs by Subprocess	WaTech	WaTech_2	WaTech %	WaTech_2 %	RGA%
Middleware	2.00	2.00	10%	7%	5%
Databases	3.00	3.00	15%	10%	7%
Planning	2.00	2.00	10%	7%	21%
Production Control	0.50	2.52	2%	8%	17%
Operations	0.20	8.29	1%	27%	25%
Second Level Support	1.50	1.50	7%	5%	5%
Admin and Change	8.50	8.50	42%	28%	12%
Management and Tools	2.70	2.70	13%	9%	8%
Total	**20.4**	**30.5**	**100%**	**100%**	**100%**
Annual Personnel Cost $000	**WaTech**	**RGA**	**% Diff**		
Annual Cost per Employed FTE	**$113.30**	**$131.93**	**-14%**		
Annual Cost per Contractor	**$0.00**	**$154.99**			
Annual Cost per FTE	**$113.30**	**$134.13**	**-16%**		

Mainframe Software Contracts – Current Contract Term & Payments

The following items require review from WaTech to ensure the financial impact of software contract termination.

- Current payment terms summary:
  - Software AG contract: Current contract runs through to June 30, 2022 with annual payments from June 2017 to June 2021. WaTech can terminate the last 2 years if notice is given by March 31, 2020 however significant penalties apply (approximately 34% of the total fees that would have been applied to those last two contract years).
  - CA contract: Current contract runs from Sept 30, 2015 to Sept 30, 2018. Termination appears to only be negotiable in the event that the state is not allocated sufficient funds in a particular calendar year to enable payment.
    - *"Licensee represents that it is a government agency or instrumentality, and that Licensee has obtained all requisite approvals and authority to enter into and perform its obligations hereunder. including, without limitation, the obligation to make the initial payment or payments required to be made hereunder on the date or dates upon which such initial payment or payments may become due during Licensee's current fiscal year. With respect to any subsequent payment which may be required to be made hereunder in any subsequent fiscal year of Licensee, the parties acknowledge that Licensee1s authority to make such subsequent payment may be contingent upon appropriation to Licensee by relevant government agencies or legislative authorities of funds sufficient for such purpose. If such additional sufficient funds are not so appropriated, either CA or Licensee may terminate this license as of the first day of the applicable subsequent fiscal year of Licensee with respect to which such sufficient funds are not made available. Licensee agrees (a) not to effect such termination for the purpose of replacing the Licensed Program(s) with an equivalent product or products supplied by others and (b) to use its best efforts to obtain such appropriation of such sufficient funds by taking all appropriate action to effect the appropriation of such additional sufficient funds."*

Mainframe Software Contracts – Current Contract Term & Payments

The following items require review from WaTech to ensure the financial impact of software contract termination.

- Current payment terms summary:
  - CompuWare contract: Current Schedule (signed Dec 2016) provides a payment schedule through December 2018. After December 2017 payment contract can be cancelled with written notice to CompuWare without penalty or obligation for and further charges. However, the contract also states that this language should not be "*construed to permit Licensee to terminate this Product Schedule or the Agreement in order to acquire similar products or services from a third party.*"
  - IBM Contract (ICA Programs): Renewed annually and paid monthly – contract can be cancelled with 30 days written notice. Next renewal is July 1, 2017.
    - *"If contract is so terminated, Purchaser is liable only for payments required by the terms of this Contract for Software and Services received and Accepted by Purchaser prior to the effective date of termination."*
  - IBM Contracts (IPLA): Renewed annually. Products are only available from IBM directly.
    - *"IPLA programs have a one-time-charge (OTC) and an (optional) annual maintenance charge, called Subscription & Support."*
    - *"Early Termination of a Software Maintenance Period for a Program: While Customer may terminate a Software Maintenance Period, IBM does not issue a credit or refund for the unused portion of a Software Maintenance Period."*

Mainframe Software Contracts – License Transferals

The following items require review from WaTech to ensure the software licenses can be transferred to another location and/or mainframe machine.

- Software transfers to another location or machine– contract terms summary:
  - Software AG contract: Transferring of Software AG licenses appears to be highly restricted. The agreement has some specific language concerning the use of the licenses in a DR situation but limits this use to 45 days but requires notification to Software AG for operating on a different operating system or a system of different capacity. The contract also makes specific references to LPAR license grants and designated LPARs and restricts usage to a maximum MSU.
    - *"The license(s) granted herein are **nontransferable** and nonexclusive license(s) to use the Product(s) specified below solely in the conduct of the Customers internal business, unless stated otherwise in the License Agreement."*
    - *"Nothing in the License Agreement(s) or this Amendment, shall be construed as to permit Licensee, without first obtaining Software AG's prior written consent, to transfer (whether by assignment, merger or acquisition, outsourcing, or otherwise) the Order Products."*
  - CA contract: Transfer rights are restrictive – customer site location is specified in the contract. Licensed MIPs capacity is stated as 1714 MIPs. DR language exists:
    - *"In no event shall the Licensed Programs be transferred outside of the Installation/Service Site Location country boundaries without the prior written consent of CA."*
    - *"Subject to the terms of this Agreement, CA grants Customer and its Authorized End Users a perpetual, non-exclusive, non-transferable license to use the Work Product produced by CA without the right to sublicense, exclusively for the business and for the data processing operations of Customer and Authorized End Users."*
    - *"No CPU upgrade fee shall be charged in the event Licensee desires to use any of the Licensed Program(s) or components thereof on any single CPU other than (but not in addition to) the Designated CPU specified in this Order Form."*

Mainframe Software Contracts – License Transferals

The following items require review from WaTech to ensure the software licenses can be transferred to another location and/or mainframe machine.

- Software transfers to another location or machine– contract terms summary:
  - CompuWare contract: Transferal of the licenses would likely require negotiation. There does not appear to be any specific language with respect to license transfer and use in a disaster situation.
    - *"This license may not be assigned or **transferred** by Customer without written consent of COMPUWARE, which consent shall not be unreasonably withheld. Customer agrees to maintain the confidential nature of the Software and related materials provided for its own internal use under this Agreement and protect them as it does its own assets and trade secrets."*
    - *"Compuware hereby grants Customer a perpetual, non-exclusive, non-transferable license to use and modify the Source Code and any modifications thereto made by or on behalf of Customer, subject to the terms of this Agreement."*
    - *"Customer further agrees that it will not lend, lease, sell, give, or otherwise dispose of or transfer the Source Code."*
    - *"Certain products are licensed to 2098 MIPs."*
    - *"Licensed location and computer/mainframe model are stated in the contract."*

Mainframe Software Contracts – License Transferals

The following items require review from WaTech to ensure the software licenses can be transferred to another location and/or mainframe machine.

- Software transfers to another location or machine– contract terms summary:
  - IBM contracts: Various language depending on the contract – not as restrictive as some of the other software vendors.
    - *"You may transfer a Program and all of Your license rights and obligations to another party only if that party agrees to the terms of this Agreement. When You transfer the Program, You must also transfer a copy o of this Agreement, including the Program's PoE. After the transfer, You may not use the Program."*
    - *"Programs acquired under this Agreement are for use within your enterprise only and may not be used to provide Tivoli Management Services external to your enterprise without IBM's prior written consent. You may not assign, transfer or otherwise remarket programs acquired at a discount or allowance."*
    - *"You may transfer SWM only to a location that is within your Enterprise and within the United States. An "Enterprise" in this Agreement is any legal entity (such as a corporation) and the subsidiaries it owns by more than 50 percent."*
    - *"You may transfer all your license rights and obligations under a Proof of Entitlement for the Program to another party by transferring the Proof of Entitlement and a copy of this Agreement and all documentation. The transfer of your license rights and obligations terminates your authorization to use the Program under the Proof of Entitlement."*
    - *"You may not transfer Support to another Enterprise."*
    - *"Customer may transfer Software Maintenance only to an entity that is within Customer's Enterprise and located within the country in which Software Maintenance is acquired, provided that the entity receiving the Eligible Program agrees to the terms of this Agreement."*
    - *"Licensee may only transfer the Program to another party, in connection with Licensee's transfer of the machine on which Licensee is entitled to operate the Program (referred to as a "Limited Transfer"), provided that any such Limited Transfer of the Program requires Licensee to transfer Licensee's rights and obligations under the Agreement to the transferee and therefore terminates Licensee's authorization to continue to use the Program."*

Mainframe Software Contracts – License Assignments

The following items require review from WaTech to ensure the software licenses can be assigned another service provider or agency.

- Software assignments to a service provider – contract terms summary:
  - Software AG contract: Assignment of Software AG licenses appears to be highly restricted and only to other State agencies operating within the State of Washington.
    - *"With the prior written consent of Software AG, which consent shall not be withheld unreasonably, the Licensee may assign this Agreement (and move the software) to any State agency within the political boundaries of the State of Washington: PROVIDED that such assignment shall not operate to relieve the Licensee of any of its duties and obligations hereunder, including the obligation to pay monthly charges when an assignment is made: and provided further that all risks and expenses incurred in connection with such removal and relocation of said software including transportation, rigging, drayage, insurance, and installation charges shall be borne by the Licensee, or its assignee."*
  - CA contract: Although assignment of the CA contract is possible there is no language that suggests that CA would not want to renegotiated pricing:
    - "*Licensee may not assign this Agreement, the use of any Licensed Program(s) or its rights and obligations under this Agreement without the prior written consent of CA, which consent shall not be unreasonably withheld."*
    - *"Customer may not assign this Agreement, the use of any Work Product or its rights and obligations under this Agreement without the prior written consent of CA."*

Mainframe Software Contracts – License Assignments

The following items require review from WaTech to ensure the software licenses can be assigned another service provider or agency.

- Software assignments to a service provider – contract terms summary:
  - CompuWare contract: Although assignment of the CompuWare contract is possible there is no language that suggests that CompuWare would not want to renegotiated pricing:
    - *“This license may not be assigned or transferred by Customer without written consent of COMPUWARE, which consent shall not be unreasonably withheld. Customer agrees to maintain the confidential nature of the Software and related materials provided for its own internal use under this Agreement and protect them as it does its own assets and trade secrets.”*
    - *“Compuware hereby grants Customer a perpetual, non-exclusive, non-transferable license to use and modify the Source Code and any modifications thereto made by or on behalf of Customer, subject to the terms of this Agreement.”*
    - *“Licensee may assign the Agreement and this product Schedule to any public agency, commission, board, or the like, within the political boundaries of the state of Washington.”*

Mainframe Software Contracts – License Assignments

The following items require review from WaTech to ensure the software licenses can be assigned another service provider or agency.

- Software assignments to a service provider – contract terms summary:
  - IBM contracts: License assignment not allowed without IBM consent.
    - *“Programs acquired under this Agreement are for use within your enterprise only and may not be used to provide Tivoli Management Services external to your enterprise without IBM's prior written consent. You may not assign, transfer or otherwise remarket programs acquired at a discount or Allowance.”*
    - *“You agree that when you acquire SWM for a Program not to assign, or otherwise transfer, this Agreement or your rights under this Agreement, or delegate your obligations, without IBM's prior written consent. Any attempt to do so is void.”*

Database and Transaction Processing

Database Configuration	WaTech	RGA
Number of database instances	112	414
Number of unique DBMS products supported on Mainframe platforms in the past 12 months	2	2
On-site second level support time for Mainframe databases, in hours per week	58	71
Production database agreed service time, in hours per week	75	61
Target percentage for production database availability	58%	71%
Number of unscheduled production database outages in the previous 6 months	2	0
Database instances per FTE for MF Databases	37	143

- The Reference Group has more instances of Mainframe databases however, the RGA also is able to manage 2.8 times more instances per mainframe database FTE than WaTech.
- For skills and effort Adabas is comparable to other Relational databases, with DB2 being the primary competitor on mainframes.

Transaction Processing Configuration	WaTech	RGA
Number of production status instances of transaction systems (regions, instances, occurrences). Count each production instance (exclude development and test) of CICS, IMS, or Tuxedo	17	30
Thousands of transactions during prime shift per week	17,564	9,387
Thousands of user production transactions during non-prime shift of the measurement week	3,276	3,118
Thousands of non-production transactions (i.e., development and test) during prime shift of the measurement week	119	264
Thousands of non-production transactions (i.e., development and test) during non-prime shift of the measurement week	42	141
Thousands of transactions per week	20,882	11,559
Percentage of production transactions processed during prime shift	84%	87%
Number of production transactions per minute during prime shift	6,461	3,041

- WaTech has a lower number of production transaction processing systems (e.g., CICS), and are processing more transactions compared to the RGA.
- WaTech's cost per MIPs for transaction processing software is 35% less than the RGA which represents an annual strength for WaTech of $230K / year.

Production Control and Batch Processing

- For the purposes of this benchmark we are treating Monday-Friday 07:00 – 17:00 hours as prime shift, as identified during the data collection.
- The RGA has a larger amount of batch processing, with a higher number of job steps during both prime and non-prime shifts.
- WaTech and the RGA are running similar percentage of jobs and job steps during prime shift.

Production Control and Batch Processing	WaTech	RGA
Number of jobs processed, including reruns and tests, during prime shift of the measurement week, (count Mainframe jobs only)	17,514	43,530
Average number of job steps per job during prime shift of the measurement week	11	17
Number of jobs processed, including reruns and tests, during non-prime shift of the measurement week, (count Mainframe jobs only)	21,809	47,920
Average number of job steps per job during non-prime shift of the measurement week	6	10
Number of production jobs processed during all shifts of the measurement week, (count Mainframe jobs only). Subset of B37100+B37200	38,323	59,367
Number of production job steps processed during all shifts of the measurement week	327,759	404,022
Average number of hours Production Control is staffed on-site, per week	168	168
Number of job failures as a percentage of the total number of jobs under the control of the Production Control function	1.3%	0.7%

Service Availability and Quality and Service Support

System Availability	WaTech	RGA
Total number of planned and unplanned service interruptions on production system images during the last 6 months	102	55
Agreed service time for the production system image, in hours per week.	164	168
Target availability of production system images during prime shift as a percentage of planned service hours.	99.5%	99.93%
Actual availability of production system images during prime shift of the last 6 months as a percentage of planned service hours.	100.0%	100.0%
Target availability of production system images during non-prime shift as a percentage of planned service hours.	99.50%	98.91%
Actual availability of production system images during non-prime shift of the last 6 months as a percentage of planned service hours.	99.92%	99.62%
Number of unplanned service interruptions (IPLs) for production system images during the last 6 months.	0	0
Number of minutes of unplanned CPU or operating system downtime for production system images, on average per week during the preceding 6 months	12	0
On-site support time for Mainframe Second Level Support, in hours per week.	45	42

- Compared with the RGA, WaTech reports higher targets for Mainframe availability (although these are targets that have not formalized) during both prime and non-prime shift.
- WaTech reported a lower target availability of production system images during prime shift (99.5% vs. 99.93% for the RGA).
- WaTech reported 102 total planned and unplanned service interruptions during the last 6 months compared to 55 for the RGA companies.
- RGA comparators have formal Service Levels that are tracked, measured, and regularly reported on.
- Both WaTech and the RGA reported 100% actual availability during prime shift.

Service Quality and Service Support - (CICS, Batch and Database)

CICS	WaTech	RGA
Percentage of production transactions with central response time less than 1 second during peak period of the measurement week	98.0%	98.0%
Percentage of production transactions with central response time less than 1 second during prime shift of the measurement week	98.9%	98.0%
Number of unscheduled production transaction processing system outages during the last 6 months, excluding VTAM	5	0
Number of production transaction failures, including database access conflicts, during the measurement week	Not Reported	287

Batch	WaTech	RGA
Percentage of production batch jobs that failed (ABENDed - aborted) during the measurement week	Not Reported	0.31%

Database	WaTech	RGA
On-site second level support time for Mainframe databases, in house per week.	58	70.8
Total number of unscheduled production database outages during the last six months, not including communications, server, operating system or client-application outages.	2	0
Target percentage for production database availability.	Not Reported	99.85%
Actual percentage for production database availability.	Not Reported	100%

- WaTech reported no production transaction failures during the measurement week.
- WaTech did not report any batch jobs that failed/ABENDed during the measurement week.
- WaTech did not report any availability service levels for databases.

Mainframe Configuration and Volumes

The table below compares the WaTech production and SunGard DR configurations for the Mainframe environment to the RGA.

- The SunGard Disaster Recovery service contracted by WaTech provides the following configuration compared to the production environment in Olympia.
- The majority of the Reference Group companies have 2 physical mainframe servers.
- The RGA configuration is comparable to that of WaTech.

Configuration	WaTech	SunGard DR	RGA
Number of physical servers	1	1	2
Number of product system images	7 (6 prod / 1 test)	7 (6 prod / 1 test)	5
Total number of configured MIPS	1,199	3,226	2,237
Number of locations where Mainframes are installed	1	1	1-2
Number of general purpose processor z/OS engines available to each SID	5	4	10
Number of active operating system images (SIDS, partitions, LPARs, etc.)	10	Up to 10 (does not include z/VM or z/Linux)	10
Average number of jobs steps per job during prime shift of the measurement week	11	11	17
Number of users with access to the Mainframe	25,759	25,759	6,500
Number of physical IIP specialty engines (zIIPs) in the machine	1	-	2
Number of physical IFL specialty engines in the machine	2	-	2
Number of Sysplex coupling facilities	2	2 (simulation)	2

Additional Detailed Benchmark Insights Results & Findings - Mainframe Storage

Mainframe Storage FTEs by Function

WaTech did not report an Mainframe Storage FTEs to change, second level support, backup and restore or central archiving compared to the RGA who reported 55% of their Mainframe Storage FTEs to these functions.

- WaTech did not report any Mainframe Storage FTEs to change, second level support, backup and restore or central archiving compared to the RGA who reported 55% of their Mainframe Storage FTEs to these functions.
- WaTech reported 30% of their FTEs for Mainframe Storage (or 0.3 FTEs) to management and tools compared to 10% for the RGA. This number seems high given that the WaTech Mainframe Storage environment is so small (15.5 TB) and that WaTech runs on shared storage hardware managed by the central WaTech Storage team.
  - WaTech's 0.3 storage management and tools FTEs were reported as 0.1 FTE to each of the following functions:
    - 0.1 FTE for line management and secretarial support.
    - 0.1 FTE for development and support of Storage methods and tools, including establishing and maintaining operational. standard and procedures, and training other support personnel.
    - 0.1 FTE for Storage configuration management, including asset management.

Proportion of FTEs by Function	WATech	WATech %	RGA %	Difference
Storage Planning and Design	0.2	20%	26%	-6%
Storage Change			23%	-23%
Storage Support	0.2	20%	13%	7%
Storage Operations	0.2	20%	6%	14%
Backup and Restore			15%	-15%
Centralized Archive			4%	-4%
Management and Tools	0.3	30%	10%	20%
Disaster Recovery	0.1	10%	4%	6%
Total	**1.0**	**100%**	**100%**	

- ISG recommends that WaTech investigate further the effort required to manage the storage for the mainframe environment. WaTech may want to consider options for leveraging the central Storage team more effectively to free WaTech Mainframe Storage resources for other tasks more specifically focused on the end to end Mainframe service.

Mainframe Storage Configuration, Volumes and Service Quality

WaTech's volumes and configuration data is inline with reference data. The SLA and outage information provided is also inline with reference data.

Service Levels	WaTech	RGA
Average number of hours Storage Operations is staffed o-site, per week	48	168
Target disk storage availability, in hours per week. The number of hours per week the disk must be available to meet he agreed service level.	168	168
Target percentage for disk storage availability	100%	99.8%
Actual percentage for disk storage availability, on average over the last 3 months.	100%	99.9%
Percentage of production data (all tiers) which can be restored within 12 hours of an incident.	100%	100%
Percentage of production data (all tiers) which can be restored within 24 hours of an incident.	100%	100%
Percentage of production data (all tiers) which can be restored in 72 hours of an incident.	100%	100%
Minimum data recovery point objective after a major incident or failure, in minutes.	1,440	1,440
Percentage of production data with the receovery point objective in M34050.	100%	100%

- WaTech's configuration, volumes and service level data is in line with the RGA.
- WaTech should consider formalizing their SLAs for Mainframe storage and ensuring these are aligned to their customers' needs and business requirements. If WaTech decides to outsource the Mainframe service it will be important to be able to manage the service provider to known and aligned service levels.

Storage Configuration and Volumes	WaTech	RGA
Total number of disk subsystems/frames/chassis/cabinets	1	6
Number of TB of utilised addressable disk storage	8	122
Number of TB of addressable disk storage across all sites or locations	15.5	193
Total number of disk drives (HDAs) configured in all frames	3,119	2,196
Number of addressable TB of disk storage configured for Virtual Tape Storage all locations	124	319
Number of logical virtual tape drives	256	310

Additional Detailed Benchmark Insights Results & Findings - Alternate Service Delivery Options & Market Pricing

ISG™ imagine your future®

Phased Strategy Details – Alternative Service Delivery Options

ISG recommends a phased strategy for WaTech if they choose to pursue options for a hosted managed service model.

In all options and phases the service provider assumes responsibility for all in scope day-to-day services.

- Phase 1 – Years 1-4: Mainframe Managed Service hosted in the WaTech DC.
  - Service Provider (SP) assumes ownership and responsibility for the WaTech mainframe hardware as part of the overall hosted service offering.
  - Service Provider gradually assumes SW costs and ownership as part of the hosted service offering (with the exception of the Software AG contract) – migration of software ownership / responsibility will have some dependencies on current contract terms and conditions.
  - Tiered Disk and Virtual Tape Storage HW, SW and Services continue to be offered and supported by the WaTech Storage teams.
  - Potential to move DR solution to the Service Provider in their data center.
- Phase 2a – Years 5-8: Mainframe / Mainframe Storage Fully Managed Service hosted in WaTech DC.
  - Service Provider continues to leverage the WaTech original HW (which the SP now owns) in the WaTech data center **or** Service Provider refreshes the HW in the WaTech Data center.
  - Service Provider also assumes ownership of SW licensing, in full.
  - Tiered Disk Storage continues to be offered and supported by the WaTech Storage team or Service Provider implements their own Tiered Disk solution in the WaTech data center.
  - Service Provider assumes ownership and management of Virtual Tape Storage solution and services.
  - Assumes DR solution has moved to the Service Provider.
- Phase 2b – Years 5-8: Mainframe / Mainframe Storage Fully Managed Service in Provider DC (or other third party DC).
  - WaTech workload migrates to new SP owned HW provided in the Service Provider DC - either dedicated or shared mainframe hardware in the SP DC.
  - Service Provider also assumes ownership of SW licensing, in full.
  - Storage solution provided by Service Provider for both Tiered Disk and Virtual Tape.
  - Assumes DR solution has moved to the Service Provider.
- Phase 3 – Years 9-10: Complete the migration of all remaining apps off the Mainframe platform and retire the WaTech Mainframe service.

Service Level Principles

Regardless of what direction WaTech takes in the future, any options involving outside suppliers will require the organization to have tightly defined Service Levels and expectations.

- SLAs help organizations measure the quality of services rendered by a Supplier, ensure that the service being bought is actually being provided, and help encourage suppliers to make the appropriate business decisions.
- Some of these decisions could revolve around:
  - Capital Investment, Software Acquisition, Training, Staffing, etc.
- Incentivizes Suppliers to engineer their solutions to meet the businesses requirements and reflect their needs.
- Encourages evolution, adaptation, innovation, and change while also prescribing continuous improvement.
- Establishes objective measures of quality service that are measurable and reportable.
- Provides WaTech with the ability to modify Service Level priorities based on evolving technology and business needs without renegotiation.

- When ISG advises clients in the Mainframe space, some examples of Critical Service Levels that are often, but not always contracted are:
  - No Development Mainframe Environment Outage Greater Than (x) Minutes.
  - No Pre-Pre-Production Mainframe Environment Outage Greater Than (x) Minutes.
  - No Production Mainframe Environment Outage Greater Than (x) Minutes.
  - Development Mainframe Application Environments Available During System Scheduled Uptime.
  - Production Batch Jobs Steps Completed Without Incident.
  - Production Mainframe Application Environments Available During System Scheduled Uptime.
  - Speed to Update the Mainframe Disaster Recovery Test Plans Following Changes.
  - Speed to Initiate File Restorations on Tier 1 Storage.

IT Pricing Trends for Mainframe Systems

- There continues to be a flat or declining demand for mainframe services as midsized clients continue to migrate mainframe applications to a server environment.
- Larger Fortune 500 clients, who view the mainframe as an integral part of the infrastructure landscape, are increasingly looking to Linux-based mainframe solutions to achieve additional cost savings. These developments are impacting service provider's ability to offer significant year-on-year price reductions, particularly for small and legacy implementations.
- Labor arbitrage has already been exploited and has come to maturity, and hardware pricing remains relatively level reflecting the position of mainframe as a non-strategic technology tower.
- Automation opportunities remain relatively elusive. Most of the gain attributable to RPA and autonomics comes from automating "application" integration rather than anything related to the underlying infrastructure.

Detailed Benchmark Insights, Results & Findings
- Management Services

Including IT Security, Facilities, Executive Management, Central Services

ISG™ imagine your future®

Management Services Annual Cost Distribution

Annual Management Services Reported Cost

Annual Cost in thousands of USD	WaTech
Annual other cost of Management Services	
Annual services cost of Management Services	$24
Annual personnel cost of Management Services	$716
Annual software cost of Management Services	
Annual hardware cost of Management Services	
Total annual cost of Management Services	**$740**

Annual Management Services Cost by Sub-Process

Annual Cost ($000)	WaTech
Central Services (Process Management)	$17
Executive Management	$451
Contracts	
Service Continuity	$26
Security	$223
Account Management	
Premises	
Management and Tools	
Total annual cost of Management Services	**$716**

- WaTech's cost of Management Services is entirely driven by the cost of personnel.
- The bulk of the Management Services cost is found in the Executive Management and IT Security sub-processes.
- WaTech's annual service cost of $24K (2 x 42u racks at $1,000/rack/month) is for premises costs in the Olympia data center. This annual cost seems very reasonable compared to the SunGard DR contract that charges $2,017/rack/month – more than double the WaTech Olympia data center chargeback rate.
- WaTech's overall overhead for Management Services is approximately 7% of the annual total for the Mainframe and Mainframe Storage services which is in line with the RGA.

Management Services Configuration, Volumes, Service Levels

Configuration and Service Levels	WaTech
Square meters of usable floor space used as a computer room (i.e. fully functional rasied floor space).	1.54
Total rated power consumption of IT equipment, in kVA	17
Number of separate connections to the electricity supplier's substations	2
Number of physically separate locations for hardware	1
Shortest distance between production and disaster recovery locations in Miles	2,861
Number of times per year when off-site recovery procedures are practiced and tested	2

Configuration and Service Levels	WaTech
Number of unique operating systems and application platforms supported by IT Security in the last 12 months	2
Actual on-time completion for User ID Adds, as a percentage, over the last 3 months.	85.6%
Number of user ID changes and password resets processed by IT Security that required manual intervention during the measurement week.	160
Number of independent user database and/or director systems.	2
Number of security alerts issued to the organisation by IT Security in the last 6 months	9
Target time for Password Reset, in minutes	120

- These tables provide configuration elements of the Facilities footprint and IT Security environment specific to the WaTech Mainframe.

Management Services FTE Distribution

- WaTech reported 6.7 total FTEs to Management Services functions – 2.1 of these FTEs were reported to IT Security.
- WaTech did not report any contractors for the in-scope services.
- 90+% of the FTEs were reported to Executive Management and IT Security functions.
- In calculating the average annual salary for Management Services employees, WaTech included a number of FTEs whose responsibilities included reporting, administrative assistance, etc. whose average annual salary lower then total average annual salary for Management services FTEs to $106.3 K / year.
- Central Services FTEs represent FTEs for project management.
- FTEs for IT Service Continuity represent 8% of 3 FTEs for DR.

Proportion of FTEs by Function	WaTech	WaTech%	RGA %	Difference
Central Services	0.2	2%	31%	-29%
Executive Management	4.2	63%	24%	39%
Service and Account Mgmt			3%	-3%
IT Service Continuity	0.2	4%	5%	-2%
IT Security	2.1	31%	21%	10%
Service and Account Management			7%	-7%
Premises			3%	-3%
Management Services Tools			5%	-5%
Total	**6.7**	**100%**	**100%**	
	WaTech	**RGA**		
Annual Cost per FTE $000 USD	$106.3	$154.3		

Breakdown by Function of Executive Managemnt FTEs	WaTech
FTEs for strategic management of the IT organisation (CIOs, IT/IS directors, CTOs, etc.)	0.4
FTEs for IT finance management (budgeting, costing, pricing, accounting, managing charge-back, and processing invoices). Exclude processing/checking network invoices (i.e. telecom expense management which is reported in ZP8000 or ZP8060	1.4
FTEs for IT Personnel/Human Resources (recruitment, advertising, benefit management, salary policies, health and safety management, appraisal processes, industrial relations and arbitration)	0.6
FTEs for administrative assistance to Executive Management	0.7
FTEs for gathering data and publishing Management Information Reports	0.3
FTEs for purchasing and procurement (purchasing management, supplier negotiation, contract management, quotations, purchase order management, tracking and delivery, pre-screening orders, selecting and validating configurations from approved lists). Do not include contract management or day to day management of IT outsourcers	0.8
Total Executive Management FTEs	**4.2**

Management Services FTE Distribution

- WaTech reported 6.7 total FTEs to Management Services functions – 2.1 of these FTEs were reported to IT Security.
- WaTech did not report any contractors for the in-scope services.
- 90+% of the FTEs were reported to Executive Management and IT Security functions.
- In calculating the average annual salary for Management Services employees, WaTech included FTEs whose responsibilities included reporting, administrative assistance, etc.

Proportion of FTEs by Function	WaTech	WaTech%	RGA %	Difference
Central Services	0.2	2%	31%	-29%
Executive Management	4.2	63%	24%	39%
Service and Account Mgmt			3%	-3%
IT Service Continuity	0.2	4%	5%	-2%
IT Security	2.1	31%	21%	10%
Service and Account Management			7%	-7%
Premises			3%	-3%
Management Services Tools			5%	-5%
Total	**6.7**	**100%**	**100%**	

ISG Team Contacts

ISG Team Contacts

Cindy LaChapelle

Principal Consultant
+1 416 571 5247 MOBILE
cindy.lachapelle@isg-one.com

Kathy Rudy

Partner
+1 847 736 9483 MOBILE
kathy.rudy@isg-one.com

John Schick

Principal Consultant
+1 219 926 1444 MOBILE
john.schick@isg-one.com

Andrew Vlahakis

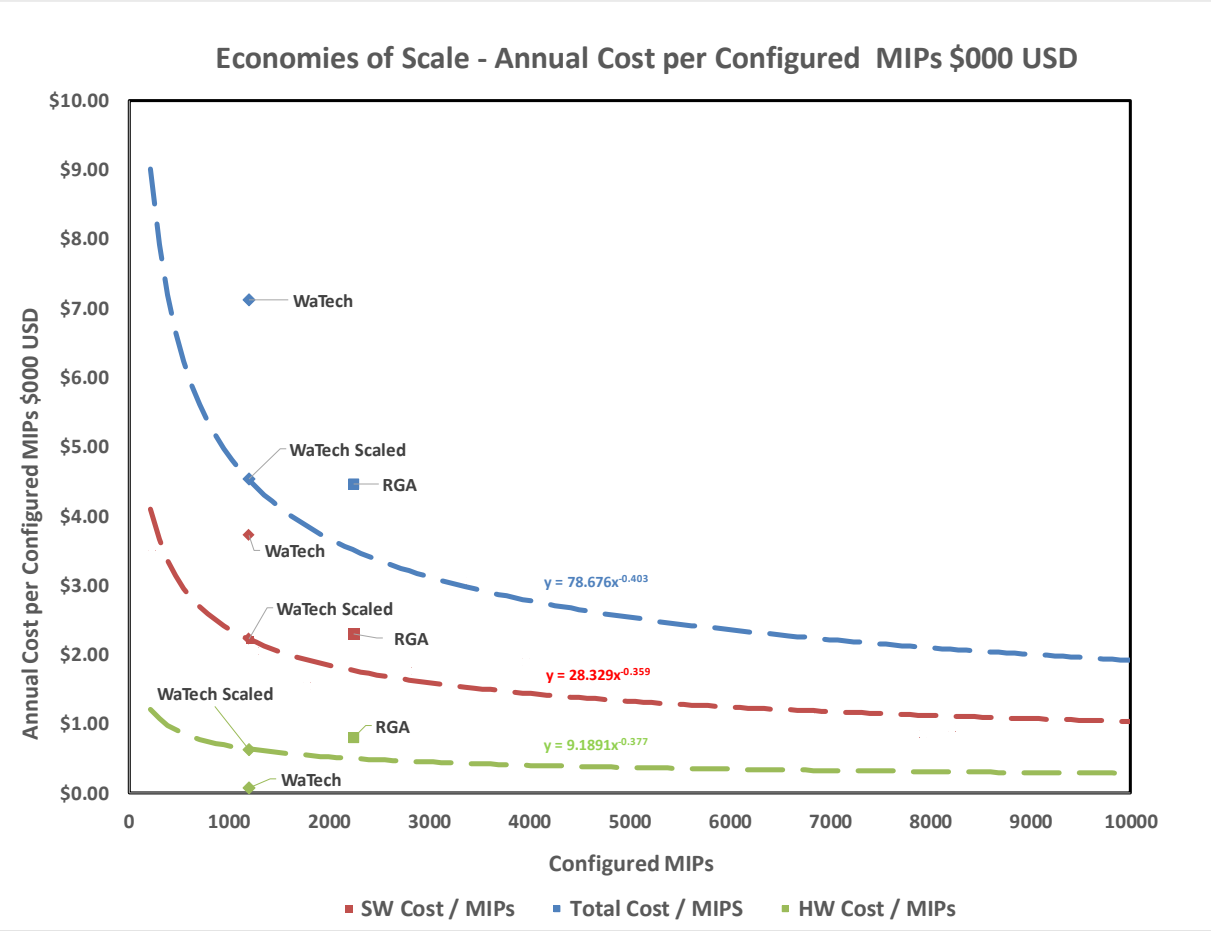
Senior Consultant
+1 215 313 1665 MOBILE
andrew.vlahakis@isg-one.com

Appendix – Mainframe Cost per MIPs Economies of Scale

ISG™ imagine your future®

Economies of Scale for Mainframe Costs

Mainframe Costs per MIPs in small to mid-sized environments cannot achieve the same economies of scale as larger Mainframe configurations. Larger Mainframe environments (4000+ MIPs) can achieve significantly greater economies of scale and lower unit costs per MIPs.



The chart shows the trends for Mainframe costs with overall size (MIPs) and the annual costs per MIPs for WaTech "As-Is", WaTech Scaled and the RGA used for comparisons.

- The WaTech Scaled costs represent the WaTech Costs for a Mainframe environment of their current size (1,199 MIPs) adjusted to the cost trendline calculated by fitting multiple data points from the ISG database.
- The Total Annual Cost/MIPs includes hardware, software, personnel and purchased services annual costs/MIPs.
- If WaTech were to run in a shared hosted environment greater economies of scale would apply.

Appendix - Project Scope

ISG™ imagine your future®

Project Scope and ISG IT Functional Model

= partially in scope of Benchmark

= in scope of Benchmark

Mgmt Services (MS)

I4 Executive Management
I3 Central Services
I7 Outsourcer Management
M4 IT Service Continuity
M6 IT Security
N2 Service & Account Management
Z2 Premises
JS Labor Markets
ZS Tools

AD/AM Services (AS)

AU Development Tools
AV Standards, Methods & QA
AY Training & Consultancy
JK Labor Markets
ZK Management & Admin

Development Projects (AD)

P1 Project Landscape
P2 Project Profile
P3 Analysis
P4 Design
P5 Development
P6 Test
P7 Release Preparation
JF Labor Markets
ZF Management & Admin

Applications (AM)

Q1 Application Landscape
Q2 Application Profile
Q3 Application Support
Q4 Super / Key User Support
Q5 Application Operations
Q6 Application Fix on Fail
Q7 Functional Enhancements
Q8 Platform Driven Enhancements
JQ Labor Markets
ZQ Management & Admin

Surveys (SU)

UA User Profile
UB User Problem Solving
UC Support Satisfaction
UD Office Technology Satisfaction
UE Business Systems Satisfaction
UF Overall Satisfaction
UP Employee Questionnaire
UZ User Population

General Info (GI)

H1 Budget Analysis
H2 Business Volumes
Z1 Study Related Information
Z6 Additional Services
J6 Labor Markets
Z9 Data Quality

Mainframe (MF)

D1 Processors
B1 Transaction Processing
B2 Interactive Processing
B3 Batch Processing
B4 VM Processing
B5 Middleware
BF Databases
G3 Planning
L5 Production Control
L6 Operations
LB Support
M5 Administration & Change
JA Labor Markets
ZA Management & Tools

Servers (SP)

DA Processors
DB Function
B7 Middleware
BA Batch Processing & Job Scheduling
BB Transaction Processing
BD Databases
G5 Planning & Design
K5 HW Change
K6 SW Distribution
L8 Support
L9 HW Maintenance
LA Monitoring & Supervision
M7 Administration & SW Change
JG Labor Markets
ZG Management & Tools

Storage (ES)

E1 Storage Architecture
E2 SAN Infrastructure
E3 Tiered Disk
E4 Virtual Tape
E5 Automatic Tape & Legacy ATL
E6 Manual Tape
E7 Optical Disk
EA Planning & Design
EB Change
EC Support
EE Operations
M1 Backup & Restore
M2 Centralized Archive Solutions
M3 Disaster Recovery
JD Labor Markets
ZD Management & Tools

Central Printing (CP)

F1 Laser Printing
F2 Impact Printing
F3 COM Production
F7 Post Processing
F8 Enveloping
JV Labor Markets
ZV Management & Tools

Service Desk (SD)

C3 Central Service Desk
C4 Local Service Desk
C5 Incident & Problem Management
JM Labor Markets
ZM Management & Tools

End User Computing (DT)

B8 Common Office Applications
BC Email
BG Collaboration Applications
D5 Mobile Devices
D6 Personal Computers
D8 Thin Clients
DF Virtualized Desktop
F9 Distributed Printers
G1 Planning & Design
K1 Desktop MAC
K2 SW Distribution
L1 Common SW Support
L3 HW Maintenance
M8 Infrastructure Server Administration
MB Backup & Restore
N3 Desktop Training
JJ Labor Markets
ZJ Management & Tools

Telecoms (TC)

S1 Private Circuits
S3 Public Frame Relay Virtual Circuits
S4 IP VPN Connections
S6 Call Volumes & Charges
S8 Access Connections
S9 Internet Circuits
T1 International Leased Circuits
T3 International Public Frame Relay Virtual Circuits
T6 International Calls & Charges
T7 Calling Cards
T8 International ATM Circuits
V3 Telecommunications Info
YT Total costs

Network (NW)

LAN
A1 LAN Architecture
A2 Switching / Routing
A4 Wireless LANs
AA Planning & Design
AB Changes
AC Support
AD Operations

WAN
W1 Architecture
W2 Switching / Routing
WA Planning & Design
WB Changes
WC Support
WD Operations

Voice
V1 Architecture
V2 PBX / Centrex
V4 VoIP / IP Telephony
VA Planning & Design
VB Changes
VC Support
VD Operations

Other
X1 Contact Centre
X2 Network Perimeter Control
X3 Remote Network Access
X4 Cabling
X6 Conferencing / Telepresence

Management & Tools
JP Labor Markets
YP Total HW & SW costs
ZP Line Management & Tools

Scope of the Benchmark

Mainframe (MF)

D1	Processors
B1	Transaction Processing
B2	Interactive Processing
B3	Batch Processing
B4	VM Processing
B5	Middleware
BF	Databases
G3	Planning
L5	Production Control
L6	Operations
LB	Support
M5	Administration & Change
JA	Labor Markets
ZA	Mgmt & Tools

Storage (ES)

E1	Storage Architecture
E2	SAN Infrastructure
E3	Tiered Disk
E4	Virtual Tape
E5	Automatic Tape & Legacy ATL
E6	Manual Tape
E7	Optical Disk
EA	Planning & Design
EB	Change
EC	Support
EE	Operations
M1	Backup & Restore
M2	Centralized Archive Solutions
M3	Disaster Recovery
JD	Labor Markets
ZD	Mgmt & Tools

WaTech has requested the following scope to be included in the benchmark.

- Mainframe;
- Storage;
- Middleware; and
- Database.

Appendix - Engagement Management

ISG™ imagine your future®

Timeline - Engagement Key Dates

Key milestones are in bold. Timeframes may shorten if data collection period can be compressed.

Pre-planning	Began April 12, 2017
Kick-off Meeting & Team Discussions	April 24, 2017
Data Collection Workshops & Stakeholder Interviews	April 24-26, 2017 (Interviews may extend into May)
Data Collected by WaTech MF Teams	April 24 – May 5, 2017
Data Due to ISG	May 8, 2017
RG Selection	May 1-12, 2017
Data Validation Presentation / Discussion	May 22, 2017
Data Corrections & Provisions of Missing Data	May 22 – May 26, 2017
Data Freeze	May 26, 2017
Benchmark Analysis & Report Writing	May 30 – June 13, 2017
Presentation of Draft Report	June 22, 2017
Delivery of the Final Report	**June 30, 2017**
Presentation of Final Report	July 31, 2017

Engagement Governance

ISG will leverage a standard governance process to document decisions regarding the engagement. In addition we will leverage our change management process to document and record material changes to scope.

- Project Management
  - Responsible for ensuring project remains on track and for managing material changes in scope as agreed by all parties though a change control process.
- Issue Management
  - Issue management is a collaborative effort among the entire project team. The Project Manager is responsible for the overall issue management process and works with the core project team for issues resolution.
- Reporting
  - ISG will provide weekly status updates to the project team and conduct a steering group meeting via teleconference every two weeks.

Appendix - Reference Group Selection

ISG™ imagine your future®

Delivery Methodology – ISG Reference Group Selection

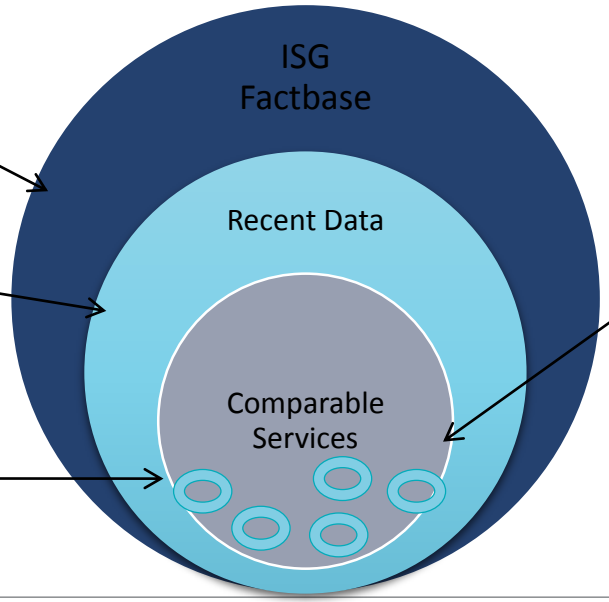
The range of the comparator data/KPIs forms the basis against which WaTech performance (cost, quality and productivity) will be compared.

- ✓ ISG provides a Reference Group of top performers.
- ✓ Reference Group members consist of the top performers in an overall dataset.
- ✓ Each group consists of at least 6 companies.
- ✓ Data shown represents the average performance of the group.
- ✓ Separate Reference Groups may be selected for each technology.

ISG Factbase
High data consistency and quality

Recent Data
Studied in the last 12-18 months
From 300+ active clients worldwide

Comparable Services
Companies/contracts delivering comparative scope



Key Criteria
Key Criteria used to select the comparators.
For example:
- **Size distribution**
- **Complexity**
- **Service levels**
- **Top performers in terms of cost efficiency, high quality**

Reference Group Company List

The table below lists the companies (anonymous as required by client request) from which ISG built the various Reference Groups. Some companies may have been used in multiple groups.

Company Headquarters	Geographic Scope	Industry
Australia	Australia	Public Sector / Government
USA	North America	BFSI / Insurance
France	Europe/APAC	BFSI / Retail Banking
USA	North America	Transportation
Canada	North America	BFSI / Insurance
USA	Global/North America	Manufacturing
USA	North America	Manufacturing
Switzerland	Europe	Manufacturing & Auto / Telecom
USA	North America	Transportation
France	Europe	BFSI / Insurance
Germany	Global/Europe	BFSI / Retail Banking
USA	North America	Manufacturing

ISG (Information Services Group) (NASDAQ: III) is a leading global technology research and advisory firm. A trusted business partner to more than 700 clients, including 75 of the top 100 enterprises in the world, ISG is committed to helping corporations, public sector organizations, and service and technology providers achieve operational excellence and faster growth. The firm specializes in digital transformation services, including automation, cloud and data analytics; sourcing advisory; managed governance and risk services; network carrier services; technology strategy and operations design; change management; market intelligence and technology research and analysis. Founded in 2006, and based in Stamford, Conn., ISG employs more than 1,300 professionals operating in more than 20 countries—a global team known for its innovative thinking, market influence, deep industry and technology expertise, and world-class research and analytical capabilities based on the industry's most comprehensive marketplace data.

isg-one.com