

Study ID	Resource Facet Investigated	Resource Predictors Used	Stage At Which Predictors Were Gathered	Notes (If Any)
S2	Cost/Effort	<ul style="list-style-type: none"> • OO-Function Points, and lines of code were used as size measures. 	Early and late	<ul style="list-style-type: none"> • OO-FPs were counted early at the OO design phase. • LOCs were counted after implementation was complete.
S3	Cost/Effort	4 predictors investigated: <ul style="list-style-type: none"> • Hyperdocument size • Connectivity • Perceived compactness • Perceived stratum 	Not specified	
S4	Cost/Effort	6 predictors investigated: <ul style="list-style-type: none"> • Number of HTML files. • Number of reused documents. • Number of links. • Perceived compactness. • Perceived stratum. • Application structure. 	Not specified	
S5	Cost/Effort	6 predictors investigated: <ul style="list-style-type: none"> • Number of HTML files. • Number of reused documents. • Number of links. • Perceived compactness. • Perceived stratum. • Application structure. 	Not specified	
S6	Cost/Effort	<ul style="list-style-type: none"> • 15 variables used to characterize a hypermedia application were used as predictors including <ul style="list-style-type: none"> ○ Length measures like Page Count, Media Count, 	Not specified	

		<p>and Program Count.</p> <ul style="list-style-type: none"> ○ Reusability measures like Reuse Media Count and Reused Program Count. ○ Complexity measures like Connectivity, Cyclomatic Complexity, and Structure. 		
S7	Cost/Effort	<p>6 predictors investigated:</p> <ul style="list-style-type: none"> ● Number of HTML files. ● Number of reused documents. ● Number of links. ● Perceived compactness. ● Perceived stratum. ● Application structure. 	Not specified	
S8	Cost/Effort	<ul style="list-style-type: none"> ● 10 size metrics considered including Node Count, Media Count, Reused Media Count, Total Node Allocation, Connectivity, and Cyclomatic Complexity. 	Not specified	
S9	Cost/Effort	<ul style="list-style-type: none"> ● Size metrics used as predictors. ● These were divided into 3 categories: Length, Complexity, and Functionality. <ul style="list-style-type: none"> ○ Length: 10 different metrics measured including Page Count, Reused Media Count etc. ○ Complexity: 4 different metrics measured: Connectivity, Connectivity Density, Total Page Complexity and Cyclomatic 	Not specified	

		<p>Complexity.</p> <ul style="list-style-type: none"> ○ Functionality: measured using COSMIC Functional Size Units. 		
S10	Cost/Effort	<ul style="list-style-type: none"> • 15 variables used to characterize a hypermedia application were used as predictors including <ul style="list-style-type: none"> ○ Length measures like Page Count, Media Count, and Program Count. ○ Reusability measures like Reuse Media Count and Reused Program Count. ○ Complexity measures like Connectivity, Cyclomatic Complexity, and Structure. 	Not specified	
S11	Cost/Effort	<ul style="list-style-type: none"> • Predictors used were both for a top-down approach to effort prediction (application measures), and for a bottom-up approach (page, media, and program measures). <ul style="list-style-type: none"> ○ Application measures include Page Count, Media Count, Reused Media Count, Connectivity, and Cyclomatic Complexity. ○ Page measures including Page Allocation, Page Complexity, and Page Linking Complexity. 	Not specified	

		<ul style="list-style-type: none"> ○ Media measures like Media Duration and Media Allocation. ○ Program measures like Code Length, and Reused Code Length. 		
S14	Cost/Effort	<ul style="list-style-type: none"> • 7 predictors (size, reusability and complexity measures) considered: <ul style="list-style-type: none"> ○ Page Count ○ Media Count ○ Program Count ○ Reused Media Count ○ Reused Program Count ○ Connectivity Density ○ Total Page Complexity 	Not specified	
S15	Cost/Effort	<ul style="list-style-type: none"> • Size metrics collected divided into 3 categories: Length, Complexity, and Functionality. <ul style="list-style-type: none"> ○ Length: 10 different metrics measured including Page Count, Reused Media Count etc. ○ Complexity: 4 different metrics measured: Connectivity, Connectivity Density, Total Page Complexity and Cyclomatic Complexity. ○ Functionality: measured using COSMIC Functional Size Units. 	Late	<ul style="list-style-type: none"> • Completed projects were sized.
S16	Cost/Effort	<ul style="list-style-type: none"> • 11 predictors were used, divided into 2 categories: <ul style="list-style-type: none"> ○ Requirements 	Early and late	<ul style="list-style-type: none"> • Requirements and design measures counted early. • Application

		<p>and Design measures (early measures) like Use Case Count, Attribute Count and Entity Count.</p> <ul style="list-style-type: none"> ○ Application Measures (late measures) like Page Count, Media Count and Total Page Complexity. 		measures counted late (after implementation).
S17	Cost/Effort	<ul style="list-style-type: none"> • 7 predictors (size, reusability and complexity measures) considered: <ul style="list-style-type: none"> ○ Page Count ○ Media Count ○ Program Count ○ Reused Media Count ○ Reused Program Count ○ Connectivity Density ○ Total Page Complexity 	Not specified	
S19	Design effort	<ul style="list-style-type: none"> • Various metrics involved with the information and navigation models of the W2000 design notation were considered as predictors: <ul style="list-style-type: none"> ○ Size measures like entities (the number of entities in the information model). ○ Complexity measures like navLinks (number of links in the navigation model). ○ Data cohesion measures like SACenters (the 	Early	<ul style="list-style-type: none"> • Composed of information and design effort as derived from the W2000 notation.

		<p>number of semantic association centers in the information model).</p> <ul style="list-style-type: none"> ○ Reuse measures like segments (the number of segments in the information model). 		
S21	Cost/Effort	<ul style="list-style-type: none"> • 7 predictors (size, reusability and complexity measures) considered: <ul style="list-style-type: none"> ○ Page Count ○ Media Count ○ Program Count ○ Reused Media Count ○ Reused Program Count ○ Connectivity Density • Total Page Complexity 	Not specified	
S22	Cost/Effort	<ul style="list-style-type: none"> • Tukutuku variables used as predictors. Out of the 32 provided for each project, 20 were chosen to characterize a Web application. • Total effort was the dependent/response variable. • The remaining 19 predictors include the number of people who worked on the project (DevTeam), average number of years of experience the team has on Web development (TeamExp), number of Web pages (Webpages), and number of high effort features (Tot-high). 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S24	Cost/Effort	<ul style="list-style-type: none"> • Tukutuku variables 	Not	<ul style="list-style-type: none"> • Variables provided

		<p>used as predictors. Out of the 32 provided for each project, 25 were chosen to characterize a Web application.</p> <ul style="list-style-type: none"> • Total effort was the dependent/response variable. • The remaining 24 predictors include the number of Web pages (Webpages), number of new Web pages (NewWP), number of new images developed (ImgNew) and number of high effort features (Tot-high). 	specified	by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S25	Cost/Effort	<ul style="list-style-type: none"> • 7 predictors (size, reusability and complexity measures) considered: <ul style="list-style-type: none"> ○ Page Count ○ Media Count ○ Program Count ○ Reused Media Count ○ Reused Program Count ○ Connectivity Density ○ Total Page Complexity 	Not specified	
S26	Cost/Effort	<ul style="list-style-type: none"> • Projects sized using Data Web Points (DWPs), which are similar to Function Points, Object Points and Web Points. • DWPs represent system functionality from the point of view of its data model, and can be obtained early in the development cycle. • Different categories of DWPs. Each category is given a weight when 	Early	

		<p>calculating the total number of DWPs and this is handled by an expert.</p> <ul style="list-style-type: none"> • Cost Drivers taken from the WebMo model are also used. 		
S27	Cost/Effort	<ul style="list-style-type: none"> • 9 cost factors identified from expert interviews/discussions including Novelty of Requirements, Developer's Technical Capabilities, and Quality of Project Management. • Web applications sized using Web Objects. 	Late	<ul style="list-style-type: none"> • Completed projects were sized.
S28	Cost/Effort	<ul style="list-style-type: none"> • Size measures were used as the sole independent variable when estimating effort. <ul style="list-style-type: none"> ○ Web objects and function points were used as size measures. 	Late	<ul style="list-style-type: none"> • Completed projects were sized. • Note that both Web objects and function points can be measured at the system requirements stage (early).
S30	Size	<ul style="list-style-type: none"> • This study looks at a way of measuring the functional size of a Web application that closely corresponds to the IFPUG method. • It looks at 3 methods that represent simplifications of the IFPUG method: <ul style="list-style-type: none"> ○ Estimated NESMA FP count. ○ Indicative NESMA FP count. • The authors own simplified method 	Early	<ul style="list-style-type: none"> • From requirements analysis
S31	Cost/Effort	<ul style="list-style-type: none"> • Functional size measured using C-FFP. 	Early	<ul style="list-style-type: none"> • Measured during design phase.
S32	Cost/Effort	<ul style="list-style-type: none"> • Tukutuku variables used as predictors. Out of the 40 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database

		<p>provided for each project, 14 were chosen to characterize Web applications and their development process.</p> <ul style="list-style-type: none"> • Total effort was the dependent/response variable. <ul style="list-style-type: none"> ○ The remaining 13 predictors include totwp (number of Web pages in application), np (number of new Web pages), procs (number of different products the Web application offers), and teamexp (average team experience with the development language(s) employed). 		<p>represent early Web size metrics and cost drivers.</p>
S34	Cost/Effort	<ul style="list-style-type: none"> • Tukatuku variables used as predictors. Out of the 43 provided for each project, 12 were chosen to characterize Web applications and their development process. • Total effort was the dependent/response variable. • The remaining 11 variables include nlang (number of different languages used on the project), teamexp (average team experience with the development language(s) employed), newwp (number of new Web pages), and hfotsa 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukatuku database represent early Web size metrics and cost drivers.

		(total number of adapted high effort features).		
S35	Cost/Effort	<ul style="list-style-type: none"> • Applications are sized using COSMIC Functional Size Units (CSFU) based the design patterns involved. • Productivity is determined either from expert judgment (i.e. the members of the development team) or from historical data on completed projects. • Application size can be adjusted using Size factors; “multipliers which reflect the complexity of the application or of individual components or processes”. • These are categorized according to whether they deal with the View, Model or Control components of the application and include MMED (multimedia), RUSE (design for reuse), and ICOM (input complexity). • Productivity can also be adjusted using multipliers not as Productivity factors. • These include REQV (requirements volatility), DOCU (documentation), DESV (design volatility), and PCAP (programmer capability). 	Early	
S37	Quality	<ul style="list-style-type: none"> • Predictors categorized as: <ul style="list-style-type: none"> ○ Coupling metrics like CBC (coupling between components). ○ Size and complexity 	Not specified	<ul style="list-style-type: none"> • Focuses on the quality attribute “testability” which is defined as “a structural quality factor of software useful to verify the quality level of a structure of Web

		<p>metrics like Sys (system size).</p> <ul style="list-style-type: none"> ○ Separation of concerns metrics like MCo (modules for concern). 		application”.
S39	Cost/Effort	<p>Dataset 1</p> <ul style="list-style-type: none"> • 7 predictors (size, reusability and complexity measures) considered: <ul style="list-style-type: none"> ○ Page Count ○ Media Count ○ Program Count ○ Reused Media Count ○ Reused Program Count ○ Connectivity Density ○ Total Page Complexity <p>Dataset 2</p> <ul style="list-style-type: none"> • 5 predictors (size and complexity measures) considered: <ul style="list-style-type: none"> ○ Page Count ○ Media Count ○ Program Length ○ Connectivity Density • Total Page Complexity 	Not specified	
S40	Cost/Effort	<ul style="list-style-type: none"> • Tukuruku variables used as predictors. Out of the 43 provided for each project, 11 were chosen to characterize Web applications and their development process. • Total effort was the dependent/response variable, and the remaining 10 variables were the independent/predictor variables. 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukuruku database represent early Web size metrics and cost drivers.

		<ul style="list-style-type: none"> • These include nlang (number of different languages used on the project), teamexp (average team experience with the development language(s) employed), and hfotsa (total number of adapted high effort functions). 		
S41	Cost/Effort	<ul style="list-style-type: none"> • Size is the only predictor measured using 2 variants of COSMIC Full Function Points (C-FFP): <ul style="list-style-type: none"> ○ C-FFPan ○ C-FFPde 	Early	<ul style="list-style-type: none"> • 2 COSMIC-FFP derivatives used to size Web applications: <ul style="list-style-type: none"> ○ C-FFPan from the application analysis documents. • C-FFPde from the application design documents.
S42	Cost/Effort	<ul style="list-style-type: none"> • Predictors divided into 2 categories: length measures and functional measures. • 8 length measures including number of web pages, number of multimedia elements, and number of client side scripts and applications. <ul style="list-style-type: none"> ○ 9 functional measures including number of external inputs and outputs, number of scripts and number of links. 	Not specified	<ul style="list-style-type: none"> • Size measures investigated were early estimators.
S43	Cost/Effort	<ul style="list-style-type: none"> • Predictors derived from Tukutuku variables. <ul style="list-style-type: none"> ○ 9 predictors in total including Devteam (number of people who have worked on the software project), 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.

		Webpages (number of Web pages), Imag (number of images), and Tot-high (number of high-effort features).		
S44	Cost/Effort	<ul style="list-style-type: none"> • 10 predictors derived from Tukutuku variables. • These include TOTWP (number of Web pages in application), NEWWP (number of new Web pages), and TOTHIGH (the sum of the number of reused high-effort features and functions with or without adaptation, and the number of new high-effort features and functions). 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S45	Maintenance	<ul style="list-style-type: none"> • Maintenance effort is the dependent variable and Cosmic functional size unit (Cfsu) the independent variable. 	Not specified	
S46	Cost/Effort	<ul style="list-style-type: none"> • Size measures were used as predictors of effort. • Two types were considered: <ul style="list-style-type: none"> ○ OO-HFP (Object Oriented Hypermedia Function Points). • A subset of 11 Tukutuku variables including TotWP (number of Web pages), Totlmg (Number of images), and HFotsA (Number of reused high-effort features/function adapted). 	Early	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S47	Design effort	<ul style="list-style-type: none"> • Each of the 3 case studies looked at 	Early	

		<p>different sets of metrics as predictors.</p> <ul style="list-style-type: none"> • These predictors are involved with the information, navigation and presentation models of the W2000 design notation and include size measures, complexity measures, data cohesion measures and reuse measures. 		
S48	Cost/Effort	<ul style="list-style-type: none"> • Size measures were used as predictors. • 4 sets investigated: <ul style="list-style-type: none"> ○ Web objects ○ Length and functional measures. ○ Tukutuku measures. • Tukutuku measures are a set of 25 variables (measures and cost drivers) that characterize a project in the Tukutuku database. <ul style="list-style-type: none"> ○ Size measures only were used consisting of 11 predictor variables including TotWP (number of new and reused Web pages), and Fots (number of features used without adaptation). ○ TotHigh (number of high effort features and functions) was the pre-eminent effort 	Early	<ul style="list-style-type: none"> • From analysis and design documents.

		<p>predictor.</p> <ul style="list-style-type: none"> • 7 length measures including number of web pages, number of multimedia elements, and number of client side scripts and applications. <ul style="list-style-type: none"> ○ SWR identified 3 measures as the main effort predictors: number of server-side applications (LSSApp), number of internal links to other components (LIL) and number of multi-media elements (LME) • 9 functional measures including number of external inputs and outputs, and number of links. • SWR identified external inputs (number of Web forms) as the main factor affecting development effort. 		
S49	Maintenance	<ul style="list-style-type: none"> • Lines of code (LOC) – measures size • Lack of cohesion in methods (LCOM) – measures cohesion • Response for classes (RFC) – measures coupling • Data abstraction coupling (DAC) – measures coupling 	<ul style="list-style-type: none"> • Late 	

S50	Cost/Effort	<ul style="list-style-type: none"> • Predictors derived from Tukatuku variables. <ul style="list-style-type: none"> ○ 9 predictors in total including Devteam (number of people who have worked on the software project), Webpages (number of Web pages), Imag (number of images), and Tot-high (number of high-effort features). 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukatuku database represent early Web size metrics and cost drivers.
S51	Cost/Effort	<ul style="list-style-type: none"> • Tukatuku variables used as predictors. • Each project in the database characterized by 25 variables related to the application and its development process. • Different estimation techniques used different subsets of Tukatuku variables as predictors. 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukatuku database represent early Web size metrics and cost drivers.
S52	Cost/Effort	<ul style="list-style-type: none"> • Tukatuku variables used as predictors. • Each project in the database characterized by 25 variables related to the application and its development process. • The final BN used a subset of 6 Tukatuku variables as predictors including TotWP (total number of Web pages), TypeProj (type of project – new or enhancement), and Metrics (if project team part of a software metrics programme). 	Not specified	<ul style="list-style-type: none"> • Tukatuku variables were decided upon the basis that they can be measured/derived from information provided by customers at an early stage in project development.

		<ul style="list-style-type: none"> • Total effort is the response variable. • The stepwise regression model took into account 6 Tukutuku variables including TotHigh (total number of high effort features or functions), and NewWP (total number of new Web pages). Certain variables required logarithmic transformation. 		
S53	Cost/Effort	<ul style="list-style-type: none"> • Tukutuku variables used as predictors. • Each project in the Tukutuku database characterized by 25 variables related to the application and its development process. • The final BN used a subset of 6 Tukutuku variables as predictors including TotWP (total number of Web pages), TypeProj (type of project – new or enhancement), and Metrics (if project team part of a software metrics programme). • Total effort is the response variable. 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S54	Cost/Effort	<ul style="list-style-type: none"> • Tukutuku variables used as predictors. • Each project in the database characterized by 25 variables related to the application and its development process. • Different estimation techniques used different subsets of Tukutuku variables as predictors. 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.

S55	Cost/Effort	<ul style="list-style-type: none"> • Each Tukutuku project characterized by 25 variables. Of these 25, 11 were used to characterize the single company projects, and 7 to characterize the cross-company projects. • Both single company and cross-company projects used predictors such as nlang (number of different development languages used), DevTeam (Size of a project's development team), and TeamExp (average team experience with the development language(s) employed). • Single company projects also used predictors like Fots (number of features reused without any adaptation), and New (number of new low-effort features/functions). 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S56	Cost/Effort	<ul style="list-style-type: none"> • WebMo predictors used: <ul style="list-style-type: none"> ○ Size measured in WebObjects. • 9 cost drivers 	Not specified	
S57	Maintenance	<ul style="list-style-type: none"> • Size was the predictor considered measured in Function Points, Object Points or Statements. • Raw size is then adjusted using: <ul style="list-style-type: none"> ○ 8 complexity measures including class hierarchy, data usage, coupling and cohesion. ○ 8 quality 	Late	<ul style="list-style-type: none"> • Measures obtained from the completed project.

		measures including modularity, portability, flexibility and maintainability.		
S58	Cost/Effort	<ul style="list-style-type: none"> • Size is used as a predictor for effort with applications being sized using Object Points. • Whilst size is the only predictor, adjustment factors and a scale factor are used to estimate effort given application size. • Adjustment factors are calculated dependent on: <ul style="list-style-type: none"> ○ Production system characteristics. ○ General system characteristics. ○ Developer's experience and capability. ○ A scale factor is used to account for "the relative economies or diseconomies of scale encountered for software projects of different sizes. 	Early	<ul style="list-style-type: none"> • Requirements analysis stage.
S62	Cost/Effort	<ul style="list-style-type: none"> • Size measures were used as predictors: <ul style="list-style-type: none"> ○ Web Objects. • COSMIC function points. 	Not specified	
S63	Cost/Effort	<ul style="list-style-type: none"> • WebMo predictors used: <ul style="list-style-type: none"> ○ Size measured in WebObjects. • 9 cost drivers. 	Not specified	<ul style="list-style-type: none"> • Predictors not explicitly mentioned in article. Effort was estimated in conjunction with project duration.
S64	Cost/Effort	<ul style="list-style-type: none"> • Predictors derived from Tukutuku variables. 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database

		<ul style="list-style-type: none"> 9 predictors in total including Devteam (number of people who have worked on the software project), Webpages (number of Web pages), Img (number of images), and Tot-high (number of high-effort features). 		<p>represent early Web size metrics and cost drivers.</p>
S65	Cost/Effort	<ul style="list-style-type: none"> Each project in the Tukutuku database characterized by 22 variables related to the application and its development process. 19 of these variables were used for the estimation techniques investigated. Different estimation techniques used different subsets of these predictors. 	Not specified	<ul style="list-style-type: none"> Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S66	Cost/Effort	<ul style="list-style-type: none"> Each project in the Tukutuku database characterized by 25 variables related to the application and its development process. 19 of these variables were used for the estimation techniques investigated. Total Effort is the dependent/response variable, with the remaining 18 variables acting as predictors. Different estimation techniques used different subsets of these predictors. 	Not specified	<ul style="list-style-type: none"> Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S67	Cost/Effort	<ul style="list-style-type: none"> Each Tukutuku project characterized by 25 variables. Of these 25, 11 were used to characterize 	Not specified	<ul style="list-style-type: none"> Variables provided by projects in the Tukutuku database represent early Web size metrics

		<p>the single company projects, and 7 (8 for the baseline cross-company model) to characterize the cross-company projects.</p> <ul style="list-style-type: none"> • Both single company and cross-company projects used predictors such as nlang (number of different development languages used), DevTeam (Size of a project's development team), and TeamExp (average team experience with the development language(s) employed). • Single company projects also used predictors like Fots (number of features reused without any adaptation), and New (number of new low-effort features/functions). 		and cost drivers.
S69	Cost/Effort	<ul style="list-style-type: none"> • Size is used as a predictor for effort with applications being sized using Object Points. • Whilst size is the only predictor, adjustment factors and a scale factor are used to estimate effort given application size. • Adjustment factors are calculated dependent on: <ul style="list-style-type: none"> ○ Production system characteristics. ○ General system characteristics. ○ Developer's experience and capability. 	Early	<ul style="list-style-type: none"> • Requirements analysis stage.

		<ul style="list-style-type: none"> • A scale factor is used to account for “the relative economies or diseconomies of scale encountered for software projects of different sizes. 		
S70	Cost/Effort	<ul style="list-style-type: none"> • Size measure in function points or Web objects used in conjunction with a productivity coefficient (determined on the basis of tech used for project). 	Late	<ul style="list-style-type: none"> • Whilst measurement took place after implementation, it was done on requirements documentation to “simulate” an early project phase.
S71	Cost/Effort	<ul style="list-style-type: none"> • Each project in the Tukutuku database characterized by 25 variables related to the application and its development process. • Different effort estimation techniques used different subsets of these variables as predictors. 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S72	Cost/Effort	<ul style="list-style-type: none"> • 19 Tukutuku variables were taken to characterize a Web application. • Different effort estimation techniques used different subsets of these variables as predictors. 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S74	Cost/Effort	<ul style="list-style-type: none"> ○ Size in COSMIC-FFP was used as the predictor for effort estimation. 	Not specified	
S75	Cost/Effort	<ul style="list-style-type: none"> • Web-COBRA requires a size measure and cost factors. • Applications were sized using Web Objects. • 10 cost factors were identified through expert interviews. 	Not specified	

		<p>These included the developer's technical capabilities, productivity of the adopted technological platform and novelty of requirements.</p>		
S76	Cost/Effort	<ul style="list-style-type: none"> • 2 sets of size measures were used as predictors. • Length measures such as Web pages (number of static Web pages), Internal Links (number of internal links used to connect sections of the Web application, and Server side Scripts and Applications (number of server side scripts and applications used to modify persistent data and/or to produce a dynamic Web page (or a section of one) based on some parameters. • The 9 components used to size applications with Web objects such as Multi-media files, Web Building Blocks, Scripts and Links). 	Not specified	
S77	Cost/Effort	<ul style="list-style-type: none"> • Web-COBRA requires a size measure and cost factors. • Applications were sized using COSMIC function points. <ul style="list-style-type: none"> ○ 10 cost factors were identified through expert interviews. These included the developer's technical capabilities, productivity of 	Not specified	

		the adopted technological platform and novelty of requirements.		
S80	Quality	<ul style="list-style-type: none"> • Predictors categorized as: <ul style="list-style-type: none"> ○ Coupling metrics like the coupling between components. ○ Cohesion metrics like the lack of cohesion in methods. ○ Size and complexity metrics like system size. • Separation of concerns metrics like modules for concern. 	Late	<ul style="list-style-type: none"> • Measures obtained from the completed project.
S81	Cost/Effort	<ul style="list-style-type: none"> • Tukutuku variables • 25 variables including size measures (length and reusability) and cost drivers 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S82	Cost/Effort	<ul style="list-style-type: none"> • Size was used as a predictor for effort. <ul style="list-style-type: none"> ○ Application size was measured using OO-HFP (object-oriented hypermedia function points), and standard function points. 	Early and late	<ul style="list-style-type: none"> • OO-HFP counted automatically using VisualWADE tool using requirements specification. FPA counted manually at the implemented Web application level (so that the FPA count would be “as accurate as possible for comparison purposes”).
S83	Cost/Effort	<ul style="list-style-type: none"> • Factors causally related to development effort included size measures of length (number of new Web pages) and reusability (number of reused Web pages), as well as a number of cost drivers 	Not specified	

		<p>(average team experience, team size, type of project).</p> <ul style="list-style-type: none"> • Most common factor was number of new Web pages. 		
S84	Cost/Effort	<ul style="list-style-type: none"> • 19 Tukutuku variables were taken to characterize a Web application. • Different effort estimation techniques used different subsets of these variables as predictors. 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S85	Cost/Effort	<ul style="list-style-type: none"> • Each project in the Tukutuku database is characterized by 25 process and product variables. • 19 of these variables were taken to characterize a Web application. • Different effort estimation techniques used different subsets of these variables as predictors. 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S87	Cost/Effort	<ul style="list-style-type: none"> • WebMo+ uses an estimate of the source lines of code based on the number of external use cases to size web applications instead of Web Objects. It uses the same 9 WebMo cost drivers. • VPM+ uses application size as a predictor of effort. Size is calculated using the average of Web Object weights for the application. 	Not specified	<ul style="list-style-type: none"> • Project duration also considered. • Both models described aim to allow effort estimation “early in the software life cycle to within +/- 20 percent across a range of application types”.
S89	Cost/Effort	<ul style="list-style-type: none"> • 9 predictors obtained from Tukutuku variables. 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.

S90	Cost/Effort	<ul style="list-style-type: none"> • Each project in the Tukutuku database is characterized by 25 process and product variables. • 19 of these variables were taken to characterize a Web application. • Different effort estimation techniques used different subsets of these variables as predictors. 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S91	Cost/Effort	<ul style="list-style-type: none"> • Tukutuku variables • 15 were used comprising a mixture of size measures (length and reuse) and cost drivers. 	Not specified	<ul style="list-style-type: none"> • Variables provided by projects in the Tukutuku database represent early Web size metrics and cost drivers.
S92	Cost/Effort	<ul style="list-style-type: none"> • Web components <ul style="list-style-type: none"> ○ Extension of function points ○ 4 additional size measures specific to Web applications ○ Multimedia files ○ Web building blocks ○ Scripts ○ Links • All size measures weighted according to complexity (low, average, high) 	Early	<ul style="list-style-type: none"> • Data obtained from specifications document prior to development
S93	Cost/Effort	<ul style="list-style-type: none"> • Effort in Person/hours • Projects sized with Web Objects or Function points. • Cost drivers used for causal model. 	Not specified	
S96	Cost/Effort	<ul style="list-style-type: none"> • RWO, WO and FP used as size measures. • For RWO, measures of application size are categorized as: 	Late	<ul style="list-style-type: none"> • After project implementation, but RWO designed to be able to be done early in the development cycle

		<ul style="list-style-type: none"> ○ Multimedia files ○ Web building blocks ○ Scripts ○ Links • Each of these measures of size has an associated measure of complexity (low, medium or high) depending upon what is being measured. • These are then used to weight the size measures. 		from project requirements.
S97	Cost/Effort	<ul style="list-style-type: none"> • Effort in Person hours • Tukutuku measures taken as a basis for effort predictors. • DE would remove or modify these predictors as well as add some of their own. • Size and complexity play important role 	Late	<ul style="list-style-type: none"> • After implementation
S98	Maintenance	<ul style="list-style-type: none"> • Most commonly referenced indicators obtained from literature. • Related factors grouped into 4 categories using factor analysis: <ul style="list-style-type: none"> ○ Application attributes (e.g. size in Web Objects, application requirements) ○ Application difficulty (e.g. application platform difficulty, application language difficulty, application complexity). 	Late	After implementation

		<ul style="list-style-type: none"> ○ Reliability modularity (e.g. application reliability, application modularity) ○ Maintenance team attributes (e.g. maintenance team capability, and experience). 		
E1	Maintenance	<ul style="list-style-type: none"> • Maintenance projects sized using COSMIC-FFP (v2.0). 	Early	
E2	Cost/Effort	<ul style="list-style-type: none"> • 15 variables used to characterize a hypermedia application were used as predictors including <ul style="list-style-type: none"> ○ Size measures like Page Count, Media Count, and Program Count. ○ Reusability measures like Reuse Media Count and Reused Program Count. • Complexity measures like Connectivity, Cyclomatic Complexity, and Structure. 	Not specified	
E3	Quality	<ul style="list-style-type: none"> • Test effort is estimated using Use Case Points. • Works on the basis that use cases can be mapped to test cases. 	Early	<ul style="list-style-type: none"> • Estimation done from the business level use cases made available at the time of signing the requirements.
E4	Design	<ul style="list-style-type: none"> • NA 	NA	<ul style="list-style-type: none"> • Exploratory study;

				design to investigate a series of hypotheses empirically.
E5	Cost/Effort	<ul style="list-style-type: none"> • Design and authoring effort • 3 categories of metrics used as predictors: <ul style="list-style-type: none"> ○ Size metrics like page count and media count. ○ Reusability metrics like reused media count and reused program count. ○ Complexity metrics like connectivity and Cyclomatic complexity. • Dependent/response variable total effort calculated as the sum of structuring effort, interlinking effort, interface planning, interface building, link testing effort, and media testing effort. 	Not specified	
E6	Cost/Effort	<ul style="list-style-type: none"> • Authoring effort the response variable. • 7 predictor variables: <ul style="list-style-type: none"> ○ Developer experience (LEL or HEL) ○ Hyperdocument size ○ Reused-documents ○ Connectivity ○ Perceived compactness ○ Perceived stratum • Application structure 	Not specified	
E7	Cost/Effort	<ul style="list-style-type: none"> • Size and complexity measures along with 	Not specified	

		cost drivers like development team size were some of the predictors used in the BN.		
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